

**Appendix C:
Biological Resources Supporting Information**

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C.1 - Biological Resources Evaluation and Botanical Inventory Report

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Biological Resources Evaluation
and
Botanical Inventory Report
for the
Suisun Logistics Center Project

Solano County, CA

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18 November 2021

Biological Resources Evaluation and Botanical Inventory Report
for the
Suisun Logistics Center Project
Solano County, CA

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I. SUMMARY OF FINDINGS AND CONCLUSIONS

This biological resources evaluation (BRE) documents baseline biological resources for the Suisun Logistics Center Project. The approximately 173.17-acre biological study area (BSA) is located southeast of the intersection of Walters and Petersen Road, adjacent to Suisun City in unincorporated Solano County, California. General biological surveys and a wetland delineation were conducted from October 2020 through November 2021. Protocol botanical surveys were conducted in March, April, July, and August 2021. Natural communities in the BSA consist of valley floor grassland, alkali meadow, seasonal wetland, freshwater marsh, coastal brackish marsh, and drainage ditches.

The BSA provides potential habitat for the following special-status wildlife species: Conservancy fairy shrimp (*Branchinecta conservatio*), vernal pool fairy shrimp (*Branchinecta lynchi*), monarch butterfly (*Danaus plexippus plexippus*), delta green ground beetle (*Elaphrus viridis*), Ricksecker's water scavenger beetle (*Hydrochara rickseckeri*), vernal pool tadpole shrimp (*Lepidurus packardi*), California tiger salamander, Central California DPS (*Ambystoma californiense*), western pond turtle (*Emys marmorata*), tricolored blackbird (*Agelaius tricolor*), grasshopper sparrow (*Ammodramus savannarum*), golden eagle (*Aquila chrysaetos*), short-eared owl (*Asio flammenus*), burrowing owl (*Athene cunicularia*), Swainson's hawk (*Buteo swainsoni*), mountain plover (*Charadrius montanus*), northern harrier (*Circus cyaneus*), yellow rail (*Coturnicops noveboracensis*), white-tailed kite (*Elanus leucurus*), loggerhead shrike (*Lanius ludovicianus*), California-black rail (*Laterallus jamaicensis coturniculus*), Suisun song sparrow (*Melospiza melodia maxillaris*), yellow-headed blackbird (*Xanthocephalus xanthocephalus*), nesting raptors and birds of prey, salt marsh harvest mouse (*Reithrodontomys raviventris*), Suisun shrew (*Sorex ornatus sinuosus*), and American badger (*Taxidea taxus*).

No federal or state listed wildlife species were observed during the biological surveys. The following other (non-listed) special-status wildlife were observed foraging in or over the BSA during surveys: 1) loggerhead shrike (state species of special concern) and 2) white-tailed kite (state fully protected). Numerous other raptor species protected under the California Fish and Game Code and/or the Migratory Bird Treaty Act were observed foraging over the BSA. No potential raptor nests were observed in the BSA. No burrows suitable for burrowing owl or badgers were observed in the BSA.

The BSA provides potential habitat for the following special-status plant species: Ferris' milk-vetch (*Astragalus tener* var. *ferrisiae*; California Rare Plant Rank [CRPR] 1B.1), alkali milk-vetch (*A. tener* var. *tener*; CRPR 1B.2), heartscale (*Atriplex cordulata* var. *cordulata*; CRPR 1B.2), brittlescale (*A. depressa*; CRPR 1B.2), vernal pool smallscale (*A. persistens*; CRPR 1B.2), big tarplant (*Blepharizonia plumosa*; CRPR 1B.1), Lyngbye's sedge (*Carex lyngbyei*; CRPR 2B.2), Congdon's tarplant (*Centromadia parryi* ssp. *congdonii*; CRPR 1B.1), pappose tarplant (*C. parryi* ssp. *parryi*; CRPR 1B.2), hispid salty bird's-beak (*Chloropyron molle* ssp. *hispidum*; CRPR 1B.1), soft salty bird's-beak (*C. molle* ssp. *mole*;

Federal Endangered/ State Rare/ CRPR 1B.2), Bolander's water hemlock (*Cicuta maculata* var. *bolanderi*; CRPR 2B.1), Suisun thistle (*Cirsium hydrophilum* var. *hydrophilum*; Federal Endangered/ CRPR 1B.1), recurved larkspur (*Delphinium recurvatum*; CRPR 1B.2), dwarf downingia (*Downingia pusilla*; CRPR 2B.2), Jepson's coyote-thistle (*Eryngium jepsonii*; CRPR 1B.2), diamond-petaled California poppy (*Eschscholzia rhombipetala*; CRPR 1B.1), San Joaquin spearscale (*Extriplex joaquinana*; CRPR 1B.2), Boggs Lake hedge-hyssop (*Gratiola heterosepala*; State Endangered/ CRPR 1B.2), hogwallow starfish (*Hesperexas caulescens*; CRPR 4.2), woolly rose-mallow (*Hibiscus lasiocarpus* var. *occidentalis*; CRPR 1B.2), Carquinez goldenbush (*Isocoma arguta*; CRPR 1B.1), Alkali-sink goldfields (*Lasthenia chrysantha*; CRPR 1B.1), Contra Costa goldfields (*L. conjugens*; Federal Endangered/ CRPR 1B.1), Ferris' goldfields (*L. ferrisiae*; CRPR 4.2), Coulter goldfields (*L. glabrata* ssp. *coulteri*; CRPR 1B.1), Delta tule pea (*Lathyrus jepsonii* var. *jepsonii*; CRPR 1B.2), Legenere (*Legenere limosa*; CRPR 1B.1), Heckard's pepper-grass (*Lepidium latipes* var. *heckardii*; CRPR 1B.2), showy golden madia (*Madia radiata*; CRPR 1B.1), marsh microseris (*Microseris paludosa*; CRPR 1B.2), Baker's navarretia (*Navarretia leucocephala* ssp. *bakeri*; CRPR 1B.1), Colusa grass (*Neostapfia colusana*; Federal Threatened/ CRPR 1B.1), San Joaquin Valley Orcutt grass (*Orcuttia inaequalis*; Federal Threatened/ State Endangered/ CRPR 1B.1), bearded popcorn flower (*Plagiobothrys hystriculus*; CRPR 1B.1), California alkali grass (*Puccinellia simplex*; CRPR 1B.2), long-styled sand-spurrey (*Spergularia macrotheca* var. *longistyla*; CRPR 1B.2), slender-leaved pondweed (*Stuckenia filiformis* ssp. *alpina*; CRPR 2B.2), Suisun Marsh aster (*Symphotrichum lentum* (= *Aster lentus*); CRPR 1B.2), saline clover (*Trifolium hydrophilum*; CRPR 1B.2), and Solano grass (*Tuctoria mucronata*; Federal Endangered/ State Endangered/ CRPR 1B.1).

No federal or state listed plants were observed in the BSA during the protocol botanical surveys conducted in March, April, July and August 2021, during the evident and identifiable period. The following two CNPS-ranked special-status plants were observed in the BSA during the botanical surveys: 1) approximately 6,196,679 pappose tarplant individuals located mostly in the central, eastern, and southern portions of the BSA and 2) approximately 885 saline clover individuals in the southeast corner of the BSA. Federal endangered Contra Costa goldfields were documented in low abundance within the BSA during previous surveys conducted by LSA in 2006 – 2008. This species was verified evident and identifiable at a nearby reference population on April 22, 2021 but was not observed in the BSA during the April 2021 survey. A second botanical survey is planned for spring 2022.

The BSA contains federal designated critical habitat for conservancy fairy shrimp, vernal pool fairy shrimp, vernal pool tadpole shrimp, and Contra Costa goldfields.

Sensitive natural communities in the BSA consist of wetlands and waters (drainage ditches, coastal brackish marsh, seasonal wetlands, and freshwater marsh) and the alkali meadow. Sensitive vegetation alliances of conservation concern are present within the valley floor grassland (*Centromadia parryi* Herbaceous Alliance) and in the alkali meadow and seasonal

wetlands present in the southern portion of the BSA (*Cressa truxillensis* – *Distichlis spicata* Herbaceous Alliance; *Frankenia salina* Herbaceous Alliance). A few riparian trees occur along the larger drainage ditches.

II. INTRODUCTION

A. Purpose of Report

The purpose of this report is to document baseline biological resources in the Suisun Logistics Center Project (Project) Biological Study Area (BSA). This report may be used in support of permit applications, including potential application for Solano Multispecies Habitat Conservation Plan (HCP) coverage, and in the California Environmental Quality Act (CEQA) review process. This report does not identify or analyze project impacts.

B. Project Location

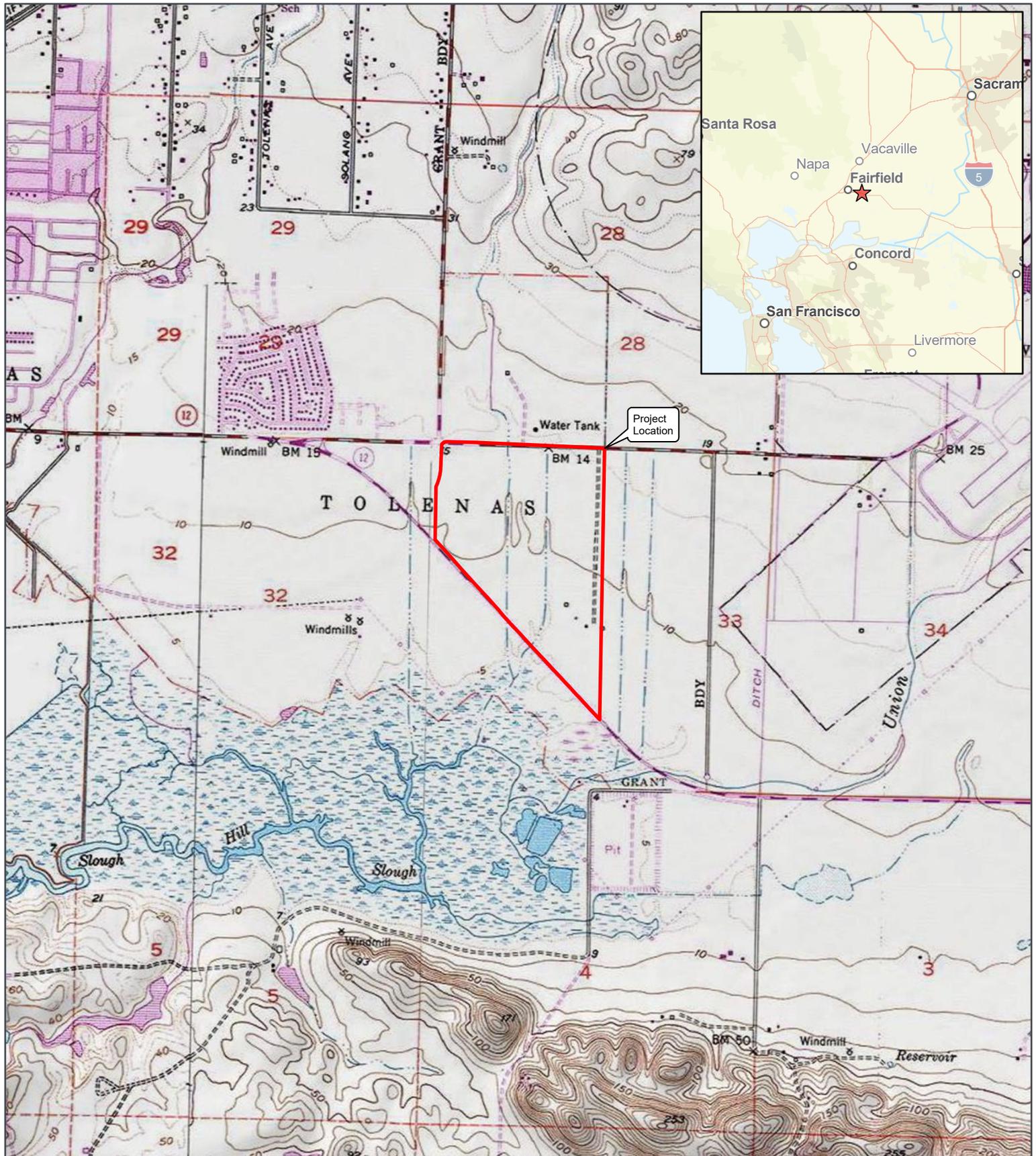
The 173.17-acre BSA is located on the south side of Petersen Road, just east of Walters Road, and north of State of California Highway 12 (SR 12), adjacent to the City of Suisun City in an unincorporated portion of Solano County, California. The BSA is on the Denverton USGS topographic quad (Section 33 T5N, R1W, Mt. Diablo Base and Meridian; Figure 1) and is located in the Suisun Bay (Hydrological Unit Code [HUC] 180050001) Hydrological Unit. The geographic coordinates of the BSA are 38.141797° north, 121.585916° west (WGS84), and the UTM coordinates are 623,916 meters east, 4,222,492 meters north, Zone 10N (WGS84). Figure 2 is a 7 February 2020 aerial photo of the BSA and surrounding area. The BSA is defined in Section III.B.

C. Project Proponent

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D. Project Description

Project design has not been finalized. Preliminary design includes the construction of six new one-story industrial buildings ranging in size from 145,397 to 644,782 square feet, loading docks, parking, access driveways, and landscaping.



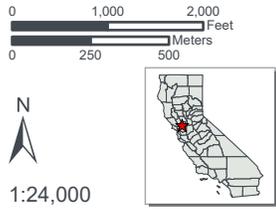
SUISUN LOGISTICS CENTER PROJECT

 Project Location

**Figure 1.
Project Location
Map**

Solano County, CA
 USGS 7.5' Quadrangle:
 Fairfield South, CA, (1980)
 Township 5 North, Range 1
 West, Tolenas Land Grant
 NAD 1983 California Teale
 Albers FtUS
 38.2375°N 121.9837°W

Base Map: ESRI ArcGIS Online,
 accessed October 2021
 Updated: 10/13/2021
 Project No. 66497
 Aprx: 66497_gabrychProperty
 Layout:
 497_gabrychProperty_Location(8x11P)



1:24,000



SWCA
 ENVIRONMENTAL CONSULTANTS



SUISUN LOGISTICS CENTER PROJECT

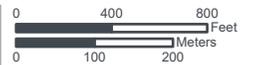
 Biological Study Area (BSA)

Figure 2.
Aerial Photograph

Solano County, CA
NAD 1983 California Teale
Albers FTUS
38.2375°N 121.9837°W

*Aerial Photograph: 7 February 2020,
20200 Maxar Technologies Imagery
Google Earth Pro*

Updated: 10/13/2021
Project No. 66497
Aprx: 66497_gabrychProperty
Layout:
66497_gabrychProperty_Aerial(8x11P)



1:9,600



SWCA
ENVIRONMENTAL CONSULTANTS

III. STUDY METHODS

A. Studies Conducted

Studies included a general biological field survey, a protocol (CDFW 2018; USFWS 2000) botanical survey, and an aquatic resource delineation. The botanical survey included mapping and classification of natural communities and vegetation alliances. Data from state and federal agencies; maps, aerial photographs, and published literature were reviewed and analyzed. An evaluation of biological resources was conducted to determine if any state or federal-listed special-status plant or wildlife species or their habitat could occur in and/or be affected by the Project.

B. Biological Study Area

The approximately 173.17-acre BSA is shown on Figures 1 through 5. The BSA consists of a main site component (169.03 acres; assessor's parcel number [APN] 0174-190-140) and two adjacent off-site components located along SR 12 (2.94 acres) and Petersen Road (1.20 acres), as summarized in Table 1.

Table 1. Biological Study Area

BIOLOGICAL STUDY AREA COMPONENT	ACREAGE
Main Site BSA	169.03
State Route 12 Off-site BSA	2.94
Petersen Road Off-site BSA	1.20
TOTAL	173.17

The BSA includes the areas anticipated to be disturbed by the project, including the proposed building site and associated driveways, bio-retention areas, potential construction access routes, and proposed staging areas. The southern portion of the BSA includes a proposed approximately 45-acre open space conservation easement. The physical and biological conditions in the BSA are discussed in Section IV (Environmental Setting).

C. Literature and Database Review

SWCA Environmental Consultants obtained lists from the U.S. Fish and Wildlife Service (USFWS Sacramento Office, unofficial list dated November 9, 2021) and the National Marine Fisheries Service (NMFS; unofficial list obtained August 26, 2020) that identify federal-listed species and critical habitat that could potentially occur in or could be affected by the Project. The California Natural Diversity Database (CNDDDB; data dated November 2, 2021) and the California Native Plant Society Inventory (CNPS; November 9, 2021) were queried for known records of special-status species in the vicinity of the BSA, on the Denverton quad and eight surrounding USGS quads. Table 2 lists the nine USGS quads evaluated. Resource lists and database query results are in Appendix A.

Table 2. USGS Quads Evaluated

Fairfield North	Elmira	Dozier
Fairfield South	Denverton	Birds Landing
Vine Hill	Honker Bay	Antioch North

Lists of CDFW special-status species reviewed included Special Animals, State and Federally Listed Endangered and Threatened Animals of California, Special Vascular Plants, Bryophytes, and Lichens List, and State and Federally Listed Endangered, Threatened, and Rare Plants of California (CDFW 2021b-e).

The 36 species proposed for coverage by the draft Solano HCP and the 36 special management species in the draft Solano HCP are evaluated in this report. The literature and database review were used to compile the table of species evaluated in Appendix B.

D. Survey Dates and Personnel

Biological, botanical, and wetland delineation fieldwork was conducted on numerous dates from October 2020 through November 2021, as summarized in Table 3. The protocol botanical survey was conducted in October 2020 and March, April, July, and August 2021 during the published blooming period for special-status plants with potential to occur in the BSA.

Table 3. Survey Dates and Personnel

DATE(S)	PERSONNEL	SURVEYS CONDUCTED
10/28/20 10/29/20	John Little, PhD Mike Bower, M.S. Alex Jamal, B.S.	Protocol botanical survey General biological survey Wetland delineation
11/19/20 11/20/20	John Little, PhD Alex Jamal, B.S.	General biological survey Wetland delineation
02/04/21 02/05/21 02/26/21	Alex Jamal, B.S.	Wetland delineation
03/08/21 03/11/21 03/12/21	Mike Bower, M.S. Monica Coll, B.S. Alex Jamal, B.S.	General biological survey Protocol botanical survey Wetland delineation
03/17/21 03/19/21	Mike Bower, M.S. Alex Jamal, B.S.	General biological survey Protocol botanical survey Wetland delineation
04/22/21	Mike Bower, M.S. Monica Coll, B.S.	General biological survey Protocol botanical survey Wetland delineation

DATE(S)	PERSONNEL	SURVEYS CONDUCTED
07/20/21 07/22/21 08/03/21	Mike Bower, M.S. Monica Coll, B.S. Ted Hermanson, M.S. Alex Jamal, B.S.	General biological survey Protocol botanical survey Wetland delineation
10/28/21	Mike Bower, M.S. Jeffery Little	Wetland delineation (field verification)
11/04/21	Charlotte Soergel, B.A.	Pool depth assessment

E. Field Survey Methods

Biological Survey

The biological survey was performed by walking through the BSA while looking for special-status wildlife species (including their sign, and their habitats), wildlife movement corridors, potentially jurisdictional wetlands and waters, special-status plants (and their habitats), and any other protected biological resources. Special attention was given to the species and habitats included in the Draft Solano Multispecies Habitat Conservation Plan (HCP). The survey included a search for burrows potentially suitable for burrowing owl (per criteria in the *Staff Report on Burrowing Owl Mitigation*; CDFW 2012) and other burrow-associated species. Areas adjacent to the BSA were inspected for sensitive habitat features such as elderberry (*Sambucus* sp.) shrubs, sensitive aquatic habitat, trees suitable for raptor nesting, and burrows. The location of protected biological resources and important habitat features were recorded on field maps and/or with sub-meter accurate GPS units. Wildlife species observed in the BSA are listed in Appendix C.

Botanical Survey

The botanical survey followed CDFW (2018) and USFWS (2000) and guidelines. The botanical survey was “floristic,” meaning that every plant taxon found was identified to the taxonomic level necessary to determine rarity and listing status. The botanical survey was conducted by botanists familiar with the local flora and special-status plant taxa with potential to occur. The survey was conducted using transects spaced approximately 50 feet apart. This distance allowed botanists to survey areas within 25 feet. Wetlands, marshes, and other mesic habitats were searched more intensively since these habitats provide suitable habitat for numerous special-status plants, including many that are very small or ephemeral. Approximately 40 person-hours were spent in the field during the October 2020 survey. Approximately 100 person-hours were spent in the field during the March-April 2021 surveys. Approximately 80 person-hours were spent in the field during the July-August 2021 surveys. Survey coverage in the BSA was 100% during each of these three periods. Plant species were either identified on-site or were collected and identified later using dichotomous keys in the Jepson Manual, 2nd ed. (Baldwin et al., eds. 2012) and Jepson eFlora (2021). Plant species observed in the BSA are listed in Appendix C.

The botanical survey included a visit to a nearby Contra Costa goldfields (*Lasthenia conjugens*) reference population located approximately 0.75 mile southeast of the BSA in alkali playa habitat along Scally Lane. Contra Costa goldfields plants were observed in flower in the reference population on April 22, 2021.

On November 29, 2020, Dr. Bruce Baldwin (UC Berkeley; author of the *Centromadia* treatment in the Jepson Manual, 2nd ed.) confirmed the identity of pappose tarplant (*Centromadia parryi* ssp. *parryi*; CRPR 1B.2) collected in the BSA based on photos of flowers provided to him via email.

Special-status plants were mapped as points or polygons. Botanists would stop and count (if fewer than approximately 50 plants were present) or estimate (if more than approximately 50 plants were present) the number of special-status plant individuals within approximately 25 feet. Polygons were used for larger, more dense populations. Population estimates for polygons were obtained by counting and/or estimating the number of plants present in representative sub-areas within the polygon (e.g., within areas approximately 10 x 10 or 100 x 100 feet in size, depending on density), calculating the number of plants per square foot, and then multiplying the result by the number of square feet within the respective polygon. Individual plants were defined as single stems emerging from the soil.

The botanical survey included classification and mapping of natural communities according to Solano Multispecies HCP land cover type definitions, and methods and vegetation alliance membership rules in *A Manual of California Vegetation, 2nd edition* (Sawyer et al. 2009; and the online version, CNPS 2021ab). The *California Natural Community List* (CDFW 2021a) was reviewed to verify vegetation alliance rarity ranks and determine if any sensitive vegetation alliances or associations occur. Vegetation data was collected on CNPS and CDFW Vegetation Rapid Assessment forms (Appendix E).

Aquatic Resource Delineation

An aquatic resource delineation was conducted in accordance with standard U.S. Army Corps of Engineers Wetland Delineation Manual methods (Corps 1987). The results of the concurrently prepared aquatic resources delineation report (SWCA 2021) have been incorporated in this BRE report. The results of the Corps' field verification on October 28, 2021, are incorporated into this report. Formal written approval of the aquatic resources delineation map by the Corps is pending.

F. Mapping

SWCA mapped biological resources observed in the field with a handheld TDC-100 Global Positioning System (GPS) unit equipped with an R-1 receiver, and with a Trimble Nomad5 equipped with an Empower Module. The GPS data were exported to Google Earth, where feature boundaries were completed with the aid of photographs and field notes. The GPS data and Google Earth polygons were exported to ArcGIS and aligned with the aerial

imagery to create Figure 4. The February 7, 2020 aerial photo in Figures 2 through 5 was downloaded from Google Earth Pro.

G. Problems Encountered and Limitations That May Influence Results

Dry conditions can affect the ability to detect some plant species, particularly annual plants, which may not germinate if precipitation is not sufficient to trigger germination. Existing field conditions were drier than normal preceding the botanical surveys, especially during the spring of 2021 (see discussion of weather conditions in Section IV.B). During the botanical surveys the vegetation did not appear substantially different from typical years (see photographs of vegetation in Appendix D), and numerous annual plants were recorded throughout the BSA (see list of species observed in Appendix C), including millions of annual pappose tarplants mapped throughout the BSA in 2021 (see Figure 5). Field observations do not indicate that dry conditions substantially influenced germination or botanical survey results. A second set of botanical surveys is planned for spring 2022.

The general biological survey may not necessarily have detected cryptic, fossorial, migratory, aestivating, or nocturnal wildlife species. Such species with habitat in the BSA could be present in or periodically utilize suitable habitat in the BSA even if not observed during a general biological survey. Signs of such species (feathers, fur, excrement, carcasses, etc.) were recorded if observed.

IV. ENVIRONMENTAL SETTING

The BSA is located in an undeveloped area immediately southeast of the City of Suisun City, less than a mile west of Travis Air Force Base (AFB), in unincorporated Solano County. The region experiences a Mediterranean climate with warm, dry summers and cold, wet winters. The broader area surrounding the BSA includes commercial and residential developments, undeveloped land, marsh land, and cultivated and fallow agricultural land. Petersen Road is on the north side of the BSA; the unpaved road right-of-way between the property line and pavement is included in the BSA. Immediately east of the BSA there are undeveloped fields consisting of tilled/grazed cropland. SR 12 is on the south side of the BSA; the unpaved road right-of-way between the property line and pavement is included in the BSA. In 2021, a new gas station was constructed along the western flank of the BSA, at the intersection of Walters Road and SR 12.

The BSA is undeveloped and generally consists of cultivated agricultural fields with scattered seasonal wetlands in the northern portion, and alkali meadow, seasonal wetland, and coastal brackish marsh in approximately the southern third of the site. The elevation in the BSA ranges from approximately 6 to 20 feet above sea level (NAVD 88). The BSA is nearly flat with a gentle north-to-south slope. Drainage is aided by numerous ditches including east-west aligned ditches bordering Petersen Road and north-south aligned ditches that travel across the central portion of the site. The north-south aligned ditches drain portions of Suisun City, and transport urban runoff and stormwater runoff southward into Hill Slough, a tidal slough located \pm 0.15 mile southeast of the BSA. Hill Slough drains primarily through Suisun Slough to Grizzly Bay. No evidence of tidal influence was observed in the BSA.

A. Soils

Mapped soil units in the BSA are Antioch-San Ysidro Complex, 0-2 Percent Slopes; Pescadero Silty-Clay Loam, 0 Percent Slopes; and Solano Loam (NRCS 1977, 2021). The major components in these soils are not hydric (NRCS 2015). The Antioch-San Ysidro Complex map unit contains 7% hydric Pescadero inclusions on basin floors. The Pescadero Silty-Clay Loam map unit contains 7% hydric Willows inclusions at on basin floors. The Solano Loam map unit does not contain hydric inclusions. Observations made during soil pit evaluation, and in several trenches excavated in the agricultural field indicate that no hardpan is present in the BSA (SWCA 2021). Figure 3 is a soils map. The following descriptions are summarized from NRCS (1977, 2021).

Antioch-San Ysidro Complex, 0-2 Percent Slopes

The Antioch-San Ysidro complex is about 50 percent Antioch Loam and 35 percent San Ysidro Sandy Loam with a remainder consisting of inclusions of Solano Loam and Pescadero Clay Loam. Descriptions of typical profiles of the major components follow.

Antioch Series

The Antioch Series soils are on nearly level to strongly sloping alluvial fans and terraces at elevations of less than 1,100 feet. The soils formed in alluvium derived from sedimentary rock. This series is moderately well to somewhat poorly drained with slow to medium runoff and very slow permeability. Soil horizons present in a typical profile of Antioch Series soils are as follows:

Ap—0 to 5 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; common fine yellowish brown (10YR 5/6) mottles, strong brown (7.5YR 5/6) moist; massive; hard, friable, slightly sticky, slightly plastic; many very fine roots; many very fine roots; many very fine and medium tubular pores; medium acid (pH 5.6); clear smooth boundary.

A1—5 to 14 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; few fine yellowish brown (10YR 5/6) mottles, strong brown (7.5YR 5/6) moist massive; hard, friable, slightly sticky, slightly plastic; few very fine roots; many fine and medium acid (pH 6.0); clear wavy boundary.

A2—14 to 19 inches; light gray (10YR 7/2) loam, dark grayish brown (10YR 4/2) moist; common fine yellowish sticky, slightly sticky; slightly plastic; few very fine roots; many fine pores; Mn stains; slightly acid (pH 6.5); abrupt smooth boundary.

Bt1—19 to 34 inches; light yellowish brown (10YR 6/4) clay, dark yellowish brown (10YR 3/3) moist; moderate very coarse prismatic structure; extremely hard, very firm, sticky, very plastic; few very fine roots; common very fine tubular pores; many moderately thick clay films on faces of peds and lining pores; few dark stains; medium acid (pH 6.0); clear wavy boundary.

Bt2—34 to 37 inches; yellowish brown (10YR 5/4) heavy clay loam, dark brown (10YR 4/3) moist; weak medium angular blocky structure; extremely hard, very firm, sticky, plastic; common very fine tubular pores; many moderately thick clay films on faces of peds and lining pores; many dark stains; moderately alkaline (pH 8.0); clear wavy boundary.

Bt3—37 to 46 inches; pale brown (10YR 6/3) clay loam, dark yellowish brown (10YR 4/4) moist, dark brown (7.5YR 3/2) and dark grayish brown (2.5Y 4/2) ped faces moist; weak medium angular blocky structure; hard, firm, sticky, plastic; common very fine tubular pores; continuous moderately thick clay films on faces of peds and lining pores; common dark stains; moderately alkaline (pH 8.0); diffuse boundary.

Bt4—46 to 60 inches; pale brown (10YR 6/3) silty clay loam, olive brown (2.5Y 4/2) and dusky red (2.5YR 3/2) faces of peds moist; weak medium angular blocky structure; hard, firm, sticky, plastic; common very fine tubular pores; continuous moderately thick

clay films on faces of peds and lining pores; common dark stains; moderately alkaline (pH 8.0); clear wavy boundary.

C1—60 to 76 inches; pale brown (10YR 6/3) loam, dark yellowish brown (10YR 4/4) moist; weak medium angular blocky structure; slightly hard, friable, slightly sticky, plastic; many very fine tubular pores; common thin clay films on faces of peds and lining pores; common dark stains; moderately alkaline (pH 8.0); clear wavy boundary.

C2—76 to 81 inches; Dark yellowish brown (10YR 4/4) moist fine sandy loam; weak medium angular blocky structure; slightly hard, friable, many very fine tubular pores; few thin clay films on faces of peds and lining pores; moderately alkaline (pH 8.0).

San Ysidro Series

The San Ysidro Series soils are on fan remnants and stream terraces of less than 1,500 feet. The soils formed in alluvium from sedimentary rocks. This series is moderately well drained with slow to medium runoff and very slow permeability. Available water capacity is 3 to 5 inches. Soil horizons present in a typical profile of San Ysidro Series soils are as follows:

Ap—0 to 7 inches; light brownish gray (10YR 6/2) fine sandy loam, brown (10YR 4/3) moist; few fine distinct mottles of brownish yellow (10YR 6/6); massive; hard, friable, nonsticky and slightly plastic; many very fine, common fine and medium roots; common very fine tubular and interstitial pores; slightly acid (pH 6.5); clear smooth boundary.

A—7 to 14 inches; light brownish gray (10YR 6/2) fine sandy loam, dark brown (10YR 3/3) moist; few fine distinct mottles of brownish yellow (10YR 6/6); massive; hard, friable, nonsticky and slightly plastic; many very fine, common fine and medium roots; common very fine tubular pores; moderately acid (pH 6.0); abrupt smooth boundary.

Bt1—14 to 28 inches; dark yellowish brown (10YR 4/4) clay, brown (7.5YR 4/4) moist; a thin 1/4 inch bleached layer, light gray (10YR 7/2), light brownish gray (10YR 6/2) moist, rests immediately on top of the prisms; strong coarse prismatic structure; extremely hard, very firm, sticky and plastic; few very fine and fine roots along ped faces; common very fine tubular pores; many moderately thick clay films on faces of peds and lining pores; common fine iron and manganese concretions; slightly acid (pH 6.5); gradual smooth boundary.

Bt2—28 to 40 inches; yellowish brown (10YR 5/6) sandy clay loam, dark yellowish brown (10YR 4/4) moist, brown (7.5YR 4/4) coatings moist; strong medium prismatic structure; extremely hard, very firm, sticky and plastic; few very fine and fine exped roots; common very fine tubular pores; many moderately thick clay films on faces of peds and lining pores; common fine iron and manganese concretions; neutral (pH 7.0); gradual smooth boundary.

Bt3—40 to 54 inches; yellowish brown (10YR 5/4) light sandy clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium prismatic structure; extremely hard, very firm, sticky and plastic; few very fine exped roots; common very fine tubular pores; many moderately thick clay films on faces of peds and lining pores; common iron and manganese concretions; neutral (pH 7.0); gradual wavy boundary.

Bt4—54 to 68 inches; light yellowish brown (10YR 6/4) light clay loam, dark yellowish brown (10YR 4/4) moist, brown (7.5YR 4/4) coatings moist; strong medium prismatic structure; hard, firm, sticky and plastic; few very fine exped roots; common very fine tubular pores; continuous moderately thick clay films on faces of peds and lining pores; moderately alkaline (pH 8.0).

Pescadero Silty Clay Loam, 0 Percent Slopes

The Pescadero Series soils are nearly level basins at elevations of 5 to 100 feet. The series consist of very deep, poorly drained soils that are formed in alluvium from sedimentary rock. Surface runoff is very slow with very slow permeability. Soil horizons present in a typical profile of Pescadero Series are as follows:

An—0 to 3 inches; light gray (2.5Y 7/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; weak medium platy structure; very hard, friable, sticky and plastic; common very fine roots; common very fine tubular pores; slightly alkaline (pH 7.7) in the upper 1 inch, moderately alkaline (pH 8.0) about an inch to 3 inches below the surface; abrupt wavy boundary.

Btng—3 to 13 inches; gray (5Y 5/1) silty clay, very dark gray (5Y 3/1) moist; strong very coarse prismatic structure; very hard, friable, sticky and plastic; common fine and many medium roots; many very fine tubular pores; many clay films on ped faces and pores; strongly alkaline (pH 8.9); gradual wavy boundary.

Btkng1—13 to 26 inches; light olive gray (5Y 6/2) silty clay, olive (5Y 4/3) moist; common fine prominent strong brown (7.5YR 5/6) masses of oxidized iron and gray (N 5/) masses of reduced iron, brown (7.5YR 4/4) and very dark gray (N 3/) moist; moderate medium prismatic structure that parts to moderate medium and coarse angular blocky structure; very hard, firm, sticky and plastic; common fine and many medium roots; common very fine tubular pores; many moderately thick clay films on faces of peds and lining pores; slightly effervescent with segregated lime as soft masses; strongly alkaline (pH 8.6); clear wavy boundary.

Btkng2—26 to 40 inches; light olive gray (5Y 6/2) silty clay, very dark grayish brown (2.5Y 3/2) moist; many fine prominent strong brown (7.5YR 5/6) masses of oxidized iron, yellowish red (5YR 4/6) moist; moderate medium prismatic structure that parts to moderate medium and coarse angular blocky; very hard, firm, sticky and plastic; few fine and common medium roots; many very fine tubular pores; many moderately thick

clay films in pores and continuous moderately thick clay films on faces of peds; slightly effervescent with segregated lime as seams and soft masses; moderately alkaline (pH 8.1); gradual wavy boundary.

Btkng3—40 to 52 inches; light olive gray (5Y 6/2) silty clay loam, olive gray (5Y 4/2) moist; many fine distinct strong brown (7.5YR 5/6) masses of oxidized iron, yellowish red (5YR 4/6) moist; moderate medium prismatic structure that parts to moderate medium and coarse angular blocky structure; hard, firm, sticky and plastic; few very fine and fine roots; many very fine tubular pores; continuous thin clay films on faces of peds, and many moderately thick clay films in pores; strongly effervescent with disseminated and segregated lime as seams; moderately alkaline (pH 7.9); gradual wavy boundary.

Btk—52 to 67 inches; pale brown (10YR 6/3) silty clay loam, brown (10YR 4/3) moist; many fine distinct strong brown (7.5YR 5/8) masses of oxidized iron, brown (7.5YR 4/4) moist; strong medium prismatic structure that parts to strong medium and coarse angular blocky structure; hard, friable, sticky and plastic; few fine roots; many very fine tubular pores; continuous thin clay films on faces of peds, common thin clay films in pores; violently effervescent with lime segregated as seams; moderately alkaline (pH 8.0); gradual wavy boundary.

Bt1—67 to 95 inches; pale brown (10YR 6/3) clay loam, brown (10YR 4/3) moist; many fine distinct strong brown (7.5YR 5/8) masses of oxidized iron, brown (7.5YR 4/4) moist; moderate medium prismatic structure that parts to strong coarse angular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; many very fine tubular pores; clay films on ped faces; violently effervescent; moderately alkaline (pH 8.1); clear wavy boundary.

Bt2—95 to 105 inches; very pale brown (10YR 7/4) silt loam, yellowish brown (10YR 5/6) moist; massive; slightly hard, friable, slightly sticky, slightly plastic; very few fine roots; common very fine tubular and few vesicular pores; common clay films in root channels and pores; moderately alkaline (pH 8.3).

Solano Loam

Solano Series soils are in nearly level low terraces and in valley plains with slightly irregular hummocky surfaces at elevation of less than 100 feet. The soils formed in moderately fine textured, sedimentary alluvium. This series is somewhat poorly drained with very slow or slow permeability. The soil has been drained and the water table lowered so that the water table is a limitation only after heavy rains or when the soil is overirrigated. Soil horizons present in a typical profile of Solano Series are as follows:

A1—0 to 4 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; few fine distinct yellowish brown (10YR 5/8) mottles, yellowish red (5YR 4/8) moist; massive; hard, friable, nonsticky, slightly plastic; many very fine and fine

random roots; many very fine tubular and common fine tubular pores; very strongly acid (pH 5.0); clear wavy boundary.

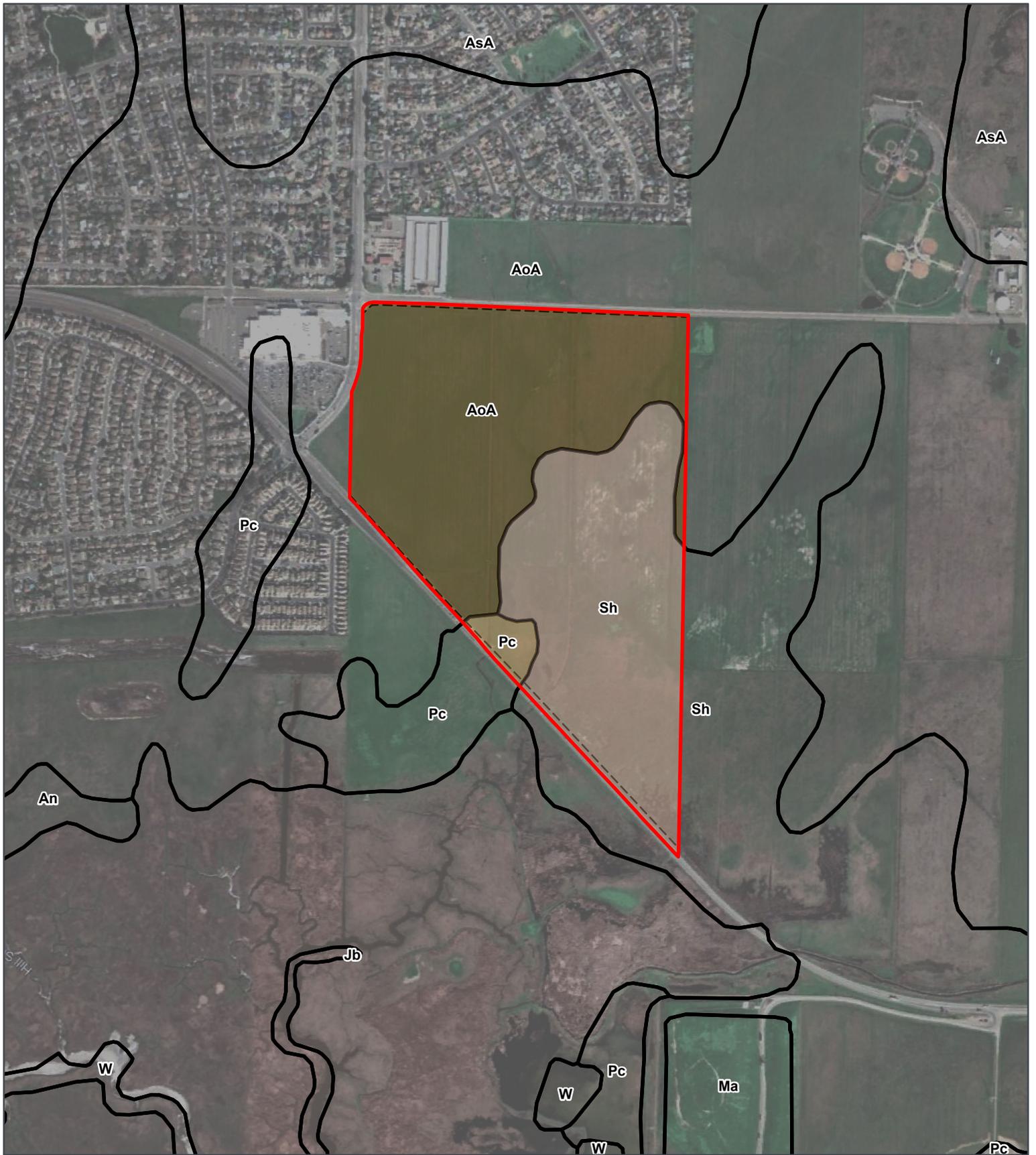
A2—4 to 9 inches; light gray (10YR 7/2) loam, dark grayish brown (10YR 4/2) moist; few fine distinct yellowish brown (10YR 5/6) mottles, dark reddish brown (5YR 3/4) moist; massive; hard, friable, sticky, slightly plastic; many very fine roots; many very fine tubular pores; strongly acid (pH 5.5); abrupt wavy boundary.

Btn—9 to 21 inches brown (10YR 5/3) clay loam, brown (10YR 4/3) moist; dark grayish brown (10YR 4/2) faces of peds moist; strong coarse columnar structure; extremely hard, firm, sticky, plastic; common very fine roots; many very fine tubular pores; many thin clay films on faces of peds and lining pores; neutral (pH 7.0); gradual wavy boundary.

Btnss1—21 to 32 inches; light yellowish brown (2.5Y 6/4) clay loam, olive brown (2.5Y 4/4) moist, dark reddish brown (5YR 2/2) stains moist; weak medium and coarse prismatic and weak medium angular blocky structure; extremely hard, firm, sticky, plastic; few very fine roots; common very fine tubular pores; many moderately thick clay films on faces of peds; common Fe and Mn concretions; few slickensides; moderately alkaline (pH 8.4); clear wavy boundary.

Btnss2—32 to 48 inches; light yellowish brown (10YR 6/4) clay loam, yellowish brown (10YR 5/6) moist, light olive brown (2.5Y 5/4) faces of peds moist with dark reddish brown (5YR 2/2) stains; weak medium and coarse prismatic and weak medium angular blocky structure; very hard, friable, slightly sticky, plastic; few very fine roots; common very fine tubular pores; many moderately thick clay films on faces of peds; strongly effervescent, medium soft bodies and concretions of lime; many Fe and Mn concretions; few slickensides; strongly alkaline (pH 8.6); gradual wavy boundary.

Btck—48 to 62 inches; light yellowish brown (10YR 6/4) silty clay loam, light olive brown (2.5Y 5/6) moist; light olive brown (2.5Y 5/4) faces of peds moist with dark reddish brown (5YR 2/2) stains; weak fine angular blocky structure; very hard, friable, sticky, plastic; common very fine tubular pores; continuous moderately thick clay films on faces of peds; strongly effervescent, large soft bodies and concretions of lime; many Fe and Mn concretions; strongly alkaline (pH 8.8).



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**Figure 3.
Soils Map**

Biological Study Area (BSA)

Soil Mapping Units (in BSA)

- AoA - Antioch-San Ysidro complex, 0 to 2 percent slopes
- Pc - Pescadero silty clay loam, 0 percent slopes, MLRA 17
- Sh - Solano loam

Solano County, CA
 NAD 1983 California Teale
 Albers FTUS
 38.2375°N 121.9837°W
 Aerial Photograph: 7 February 2020,
 20200 Maxar Technologies Imagery
 Google Earth Pro
 Soil Survey Geographic database for
 Solano County, CA (14 Dec. 2006)
 Updated: 11/18/2021
 Project No. 66497
 Aprx: 66497_gabrychProperty
 Layout:
 66497_gabrychProperty_Soils(8x11P)

0 500 1,000 Feet
 0 125 250 Meters

N

1:12,000

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B. Weather Conditions

Biological and botanical surveys were conducted in October and November 2020, and in March, April, July and August of 2021 (Table 3). Weather conditions were generally clear, calm, and sunny during fieldwork with no precipitation and no intense wind, heat, or cold. All parts of the California experienced drought in 2021 (U.S. Drought Monitor 2021). Precipitation recorded at the nearby Fairfield (FRF) Weather Station, located approximately 5 miles northwest of the Project area at an elevation of 40 feet, is summarized below. Precipitation received at the FRF gauge is expected to be similar to that experienced in the BSA. The percent of normal precipitation reported below is based on the average for the same period as logged by the FRF gauge (CDEC 2021). The aquatic resource delineation report contains additional precipitation analysis for the weeks preceding fieldwork survey days (SWCA 2021).

- October 2020 – 14.34 inches observed October 1, 2019, through September 30, 2020 (58.6% of normal)
- March 2021 – 7.68 inches observed October 1, 2020, through February 28, 2021 (41.1% of normal)
- April 2021 – 9.21 inches observed October 1, 2020, through March 31, 2021 (42.3% of normal)
- July 2021 – 9.34 inches observed October 1, 2020, through June 30, 2021 (38.4% of normal)

C. Natural Communities

Natural communities are defined by species composition and relative abundance. Natural communities described below correlate where applicable with *A Manual of California Vegetation, 2nd Edition* (Sawyer et al. 2009), and the most recent *California Natural Communities List* (CDFW 2021a). Natural communities are shown on Figure 4 and their acreages are in Table 4. Photographs of the BSA are in Appendix D. Mapping of natural communities in this report follows the land cover type mapping described in the Draft Solano HCP (SCWA 2012).

Table 4. Natural Communities

NATURAL COMMUNITY	VEGETATION ALLIANCES (CDFW CODE / RARITY RANK)	ACREAGE ²
<i>Upland Communities</i>		
Valley Floor Grassland	<i>Festuca perennis</i> Semi-Natural Alliance (41.321.00 / No Rank) <i>Avena</i> spp. – <i>Bromus</i> spp. Semi-Natural Alliance (42.027.00 / No Rank) <i>Centromadia parryi</i> Herbaceous Alliance (44.160.00 / G2 S2)	133.25
Alkali meadow	<i>Distichlis spicata</i> Herbaceous Alliance (41.200.00 / GNR S4) <i>Centromadia parryi</i> Herbaceous Alliance (44.160.00 / G2 S2) <i>Cressa truxillensis</i> – <i>Distichlis spicata</i> Herbaceous Alliance (46.100.00 / G2 S2) <i>Frankenia salina</i> Herbaceous Alliance (52.500.00 / G4 S3)	16.91
<i>Aquatic Communities</i>		
Drainage Ditch (Freshwater Marsh in DD-01)	<i>Typha (domingensis, latifolia)</i> Herbaceous Alliance (52.050.00 / G5 S5) <i>Schoenoplectus acutus</i> Herbaceous Alliance (52.128.00 / GNR S3S4)	0.74
Drainage Ditch (Seasonal Wetland in DD-02)	None recognized	0.65
Drainage Ditch (Roadside Ditches DD-03 through -06)	None recognized	0.09
Seasonal Wetland	<i>Festuca perennis</i> Herbaceous Semi-Natural Alliance (41.321.00 / No Rank) <i>Distichlis spicata</i> Herbaceous Alliance (41.200.00 / GNR S4) <i>Centromadia parryi</i> Herbaceous Alliance (44.160.00 / G2 S2) <i>Atriplex prostrata</i> – <i>Cotula coronopifolia</i> Herbaceous Semi-Natural Alliance (52.211.00 / No Rank) <i>Cressa truxillensis</i> – <i>Distichlis spicata</i> Herbaceous Alliance (46.100.00 / G2 S2)	14.57
Coastal Brackish Marsh	<i>Typha (domingensis, latifolia)</i> Herbaceous Alliance (52.050.00 / G5 S5) <i>Schoenoplectus acutus</i> Herbaceous Alliance	3.36

NATURAL COMMUNITY	VEGETATION ALLIANCES (CDFW CODE / RARITY RANK)	ACREAGE ²
	(52.128.00 / GNR S3 S4)	
<i>Developed Areas</i>		
Developed (Ruderal)	None recognized	2.89
Developed (Hardscape)	None recognized	0.71
TOTAL		173.17

¹ Vegetation alliances based on descriptions and classification methods in Sawyer et al. (2009) and A Manual of California Vegetation, Online Version (CNPS 2021a). Communities may lack recognized alliances if they lack vegetation, occupy a small area, or are dominated by nonnatives. Alliance codes and ranks are from CDFW (2021a). Rarity ranks of State (S) 1 – 3 are of conservation concern. Rarity ranks are defined as follows:

G1 S1: Critically imperiled worldwide/ statewide

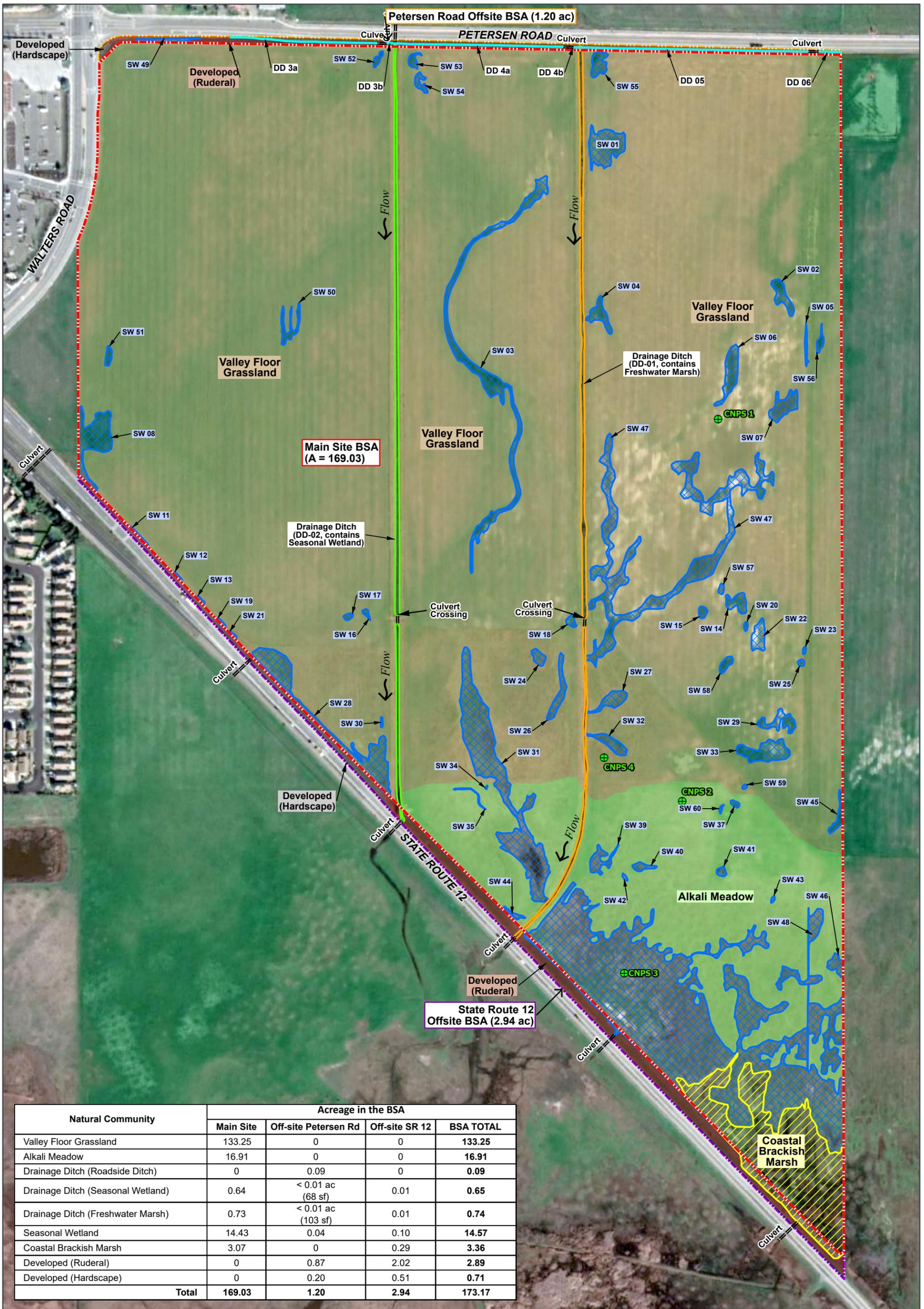
G2 S2: Imperiled worldwide/ statewide

G3 S3: Vulnerable worldwide/ statewide

G4 S4: Apparently secure worldwide/ statewide

G5 S5: Demonstrably secure because of its worldwide/
statewide abundance

² Acreages were calculated using AutoCAD or ArcMap functions. Acreages reported here are for the entire BSA (Main Site plus off-site areas along Petersen Road and SR 12).



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Figure 4. Biological Resources Map

- ▬ Main Site Biological Study Area (BSA; 169.03 ac)
- ▬ Petersen Road Offsite BSA (1.20 ac)
- ▬ State Route 12 Offsite BSA (2.94 ac)
- ▬ Culvert
- CNPS Vegetation Data Point

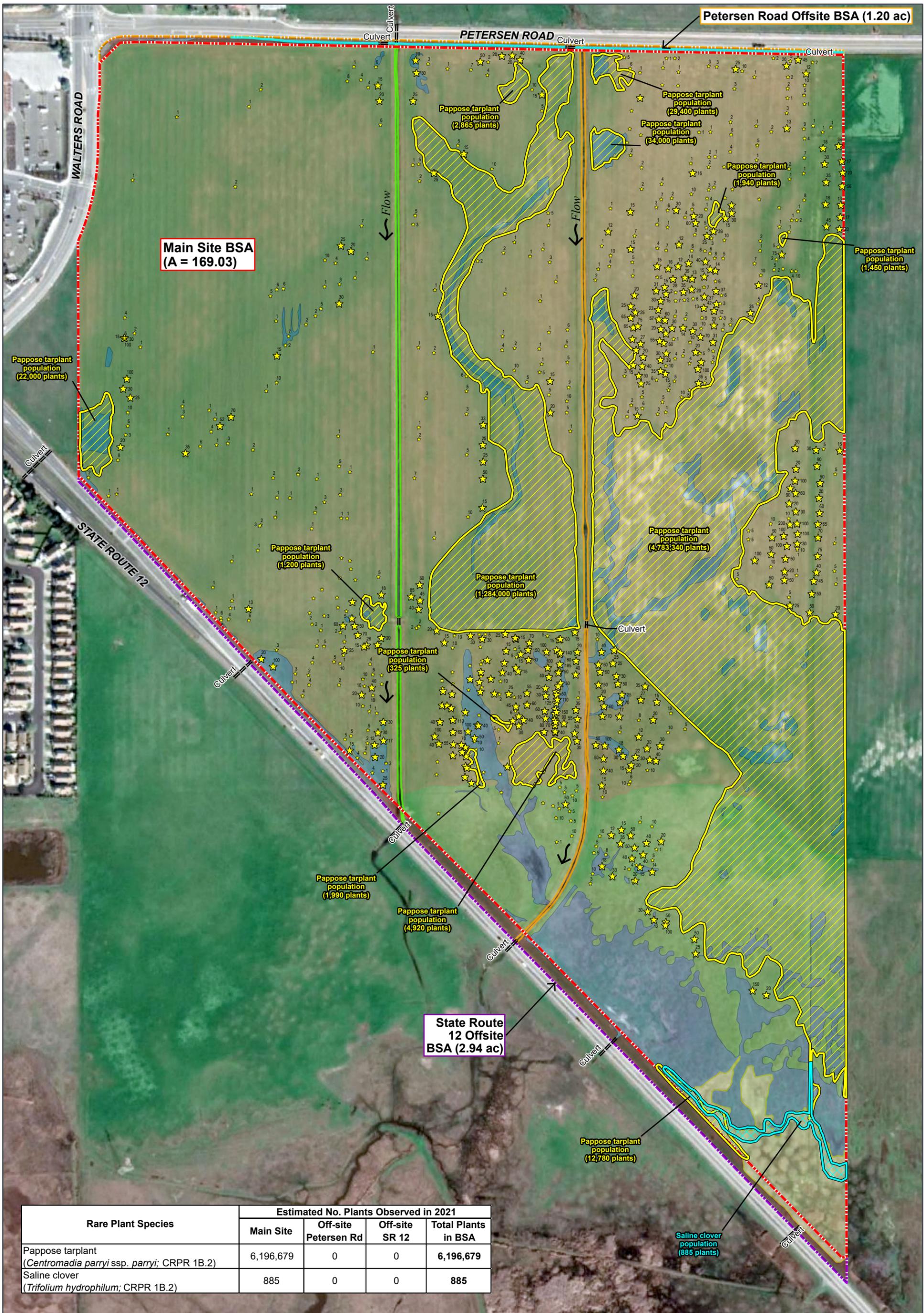
- ▬ Drainage Ditch (Roadside Ditch)
- ▬ Drainage Ditch (Seasonal Wetland)
- ▬ Drainage Ditch (Freshwater Marsh)
- ▬ Seasonal Wetland
- ▬ Coastal Brackish Marsh
- ▬ Valley Floor Grassland
- ▬ Alkali Meadow
- ▬ Developed (Ruderal)
- ▬ Developed (Hardscape)

Solano County, CA
 NAD 1983 StatePlane California II FIPS 0402 Feet
 38.2375°N 121.9837°W

Aerial Photograph: 7 February 2020, 20200 Maxar Technologies Imagery, Google Earth Pro
 Updated: 11/9/2021
 Project No. 66497
 Layout: 6497_gabrychProperty_Biores(11x17P)
 Aprx: 66497_gabrychProperty

Scale: 1:3,600
 0 30 60 Meters
 0 150 300 Feet

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Rare Plant Species	Estimated No. Plants Observed in 2021			
	Main Site	Off-site Petersen Rd	Off-site SR 12	Total Plants in BSA
Pappose tarplant (<i>Centromadia parryi</i> ssp. <i>parryi</i> ; CRPR 1B.2)	6,196,679	0	0	6,196,679
Saline clover (<i>Trifolium hydrophilum</i> ; CRPR 1B.2)	885	0	0	885

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Figure 5. Rare Plants Observed in 2021

- Legend**
- Main Site Biological Study Area (BSA; 169.03 ac)
 - Petersen Road Offsite BSA (1.20 ac)
 - State Route 12 Offsite BSA (2.94 ac)
 - Culvert

- Natural Communities**
- Drainage Ditch (Roadside Ditch)
 - Drainage Ditch (Seasonal Wetland)
 - Drainage Ditch (Freshwater Marsh)
 - Seasonal Wetland
 - Coastal Brackish Marsh
 - Valley Floor Grassland
 - Alkali Meadow
 - Developed (Hardscape)
 - Developed (Ruderal)

- Rare Plants**
- Pappose tarplant population
 - ★ Pappose tarplant location point (≤ 10 plants)
 - ★ Pappose tarplant location point (≥ 11 plants)
 - Saline Clover plant population

Solano County, CA
 NAD 1983 StatePlane California II FIPS 0402 Feet
 38.2375°N 121.9837°W

Aerial Photograph: 7 February 2020, 20200 Maxar Technologies Imagery Google Earth Pro

Updated: 11/8/2021
 Project No. 66497
 Layout: 66497_gabrychProperty_Botanical(11x17P)
 Aprx: 66497_gabrychProperty

0 140 280 Feet
 0 30 60 Meters

N

1:3,600

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1. Valley Floor Grassland

A total of 133.25 acres of valley floor grassland occurs in the BSA (Figure 4; Appendix D, Photos 1-6, 26, and 27). The valley floor grassland occurs throughout the northern two-thirds of the BSA. The valley floor grassland is grazed by cattle. Most of the valley floor grassland (all except the southernmost $\pm 10\%$) has been repeatedly disked and subject to dryland farming. The field was planted with wheat (*Triticum aestivum*) in 2020. The fields were left fallow in 2021 to facilitate the wetland delineation. The draft Solano HCP classifies areas of dryland farming within the valley floor grassland community as a grassland community rather than an agricultural community since many of the grassland ecosystem functions remain (SCWA 2012). This community is on a low terrace that slopes gently southward, transitioning to alkali meadow (described below).

In addition to planted crops such as wheat, the valley floor grassland in the BSA is generally dominated by nonnative grasses including wild oat (*Avena* sp.), bromes (*Bromus diandrus*, *B. hordeaceus*), Italian rye grass (*Festuca perennis*), Mediterranean barley (*Hordeum marinum* ssp. *gussoneanum*), and by native and nonnative herbs including pappose tarplant (*Centromadia parryi* ssp. *parryi*), hayfield tarweed (*Hemizonia congesta* ssp. *luzulifolia*), yellow star-thistle (*Centaurea solstitialis*), purple thistle (*Centaurea calcitrapa*), prickly lettuce (*Lactuca serriola*), summer mustard (*Hirschfeldia incana*), storksbill (*Erodium botrys*), bindweed (*Convolvulus arvensis*), vetch (*Vicia sativa*, *V. villosa*), and buttercup (*Ranunculus muricatus*). Other native species present include alkali-mallow (*Malvella leprosa*), alkali weed (*Cressa truxillensis*), alkali heath (*Frankenia salina*), toad rush (*Juncus bufonius*), gumplant (*Grindelia camporum*), coyote thistle (*Eryngium aristulatum* var. *aristulatum*), buttercup (*Ranunculus californicus*), and blue dicks (*Dichelostemma capitatum*).

Most of this community in the BSA contains over 60% relative cover of nonnative grasses (mainly rye grass and bromes) and less than 10% relative cover of native herbs. Most of the valley floor grassland would be classified as either *Avena* spp. – *Bromus* spp. Herbaceous Semi-Natural Alliance (no rarity rank) or *Festuca perennis* Semi-Natural Alliance (no rarity rank) based on published membership rules (Sawyer et al. 2009; CNPS 2021a). Between 30 and 40 acres of the valley floor grassland is conspicuously dominated by $\pm 25\%$ (or more) absolute cover of pappose tarplant (*Centromadia parryi*) and would be classified as *Centromadia parryi* Herbaceous Alliance based on published alliance descriptions and membership rules (Sawyer et al. 2009; CNPS 2021a; see CNPS Vegetation Rapid Assessment Datasheet in Appendix E). The *Centromadia parryi* Herbaceous Alliance has a state rarity rank of S2 (imperiled statewide) and is of conservation concern. This alliance occurs in the areas of dense pappose tarplant that were mapped as polygons during the protocol botanical survey (see Figure 5; mostly in the central and eastern parts of the BSA; total alliance area 43.08 acres, including portions of seasonal wetland and alkali meadow described below). Pappose tarplant is a California Rare Plant Rank (CRPR) 1B.2 rare plant (see additional discussion of pappose tarplant in Section V.D). While the cultivated valley floor grassland dominated by nonnative plants is not of conservation concern, the portion of this community dominated by pappose tarplant is of conservation concern.

Seasonal wetlands (described below) are occasional within shallow depressions in the valley floor grassland community. The seasonal wetlands were mapped separately and occupy less than 5% of the area classified as valley floor grassland.

2. Alkali Meadow

Approximately 16.91 acres of alkali meadow occurs in the BSA (Figure 4; Appendix D, Photos 21 and 22). The alkali meadow occurs in the roughly the southern third of the BSA, immediately south of areas classified as valley floor grassland. This community is on a low terrace that slopes gently southward, transitioning to seasonal wetland and brackish marsh (described below). The area mapped as alkali meadow is dominated by hydrophytic and halophytic plants but does not meet wetland criteria (SWCA 2021). Shallow depressions within the alkali meadow sometimes met wetland criteria and were classified as seasonal wetland (described below). The alkali meadow is grazed by cattle.

Most of the alkali meadow is dominated by salt grass (*Distichlis spicata*). Portions of the alkali meadow are dominated or co-dominated by alkali weed, alkali heath, pappose tarplant, Italian rye grass, and Mediterranean barley (*Hordeum marinum* ssp. *gussoneanum*), and storkbill. Native wildflowers such as common muilla (*Muilla maritima*), lomatium (*Lomatium utricularium*), geranium-leaved checkerbloom (*Sidalcea malviflora* ssp. *laciniata*) are present, generally atop hummocks within the alkali meadow.

Most of this community contains over 50% relative cover of salt grass and would be classified as *Distichlis spicata* Herbaceous Alliance (state rarity rank S4 – apparently secure statewide) based on published alliance descriptions and membership rules (Sawyer et al. 2009; CNPS 2021a). Portions of this community are dominated by pappose tarplant and would be classified as *Centromadia parryi* Herbaceous Alliance (state rarity rank S2 – imperiled statewide; described above; see pappose tarplant polygons on Figure 5). Portions of this community may meet membership rules for *Cressa truxillensis* – *Distichlis spicata* herbaceous alliance (state rarity rank S2 – imperiled statewide) and *Frankenia salina* Herbaceous Alliance (state rarity rank S3 – vulnerable statewide), however these areas are not extensive (estimated to be less than an acre). The CNDDDB tracks alkali meadow occurrences and assigns this community a state rarity rank of S2 (imperiled statewide).

3. Drainage Ditch (Including Freshwater Marsh and Seasonal Wetlands Therein)

The BSA contains six drainage ditches (DD) described below. DD-01 (0.74 acre) and DD-02 (0.65 acre) are larger north-south aligned drainage ditches with perennial and intermittent flow, respectively. DD-03 through DD-06 (0.09 acre) are roadside ditches with ephemeral flow that occur along the south side of Petersen Road. The ditches are shown on Figure 4. Photos of the ditches are in Appendix D (photos 7-12).

DD-01 (Freshwater Marsh)

DD-01 is a man-made drainage ditch with perennial flow. DD-01 contains a stream channelized for flood control (SCWA 2012). The ditch is classified as an Order 1 Stream in National Hydrology Dataset (NHD) blue line streams data layer (USGS 2019). Aerial photographs show a few tributaries draining into the stream north of the BSA (upstream of the portion culverted beneath development in Suisun City), and thus the portion of DD-01 in the BSA may be an Order 2 Stream. DD-01 was flowing during all fieldwork (usually as a barely discernable trickle). DD-01 is dominated by obligate wetland plants. DD-01 enters the site through a concrete box culvert beneath Petersen Road and flows south through the site. The ditch passes through a culvert beneath a ranch road in the southern portion of the BSA before curving to the west, leaving the site through a culvert beneath SR 12. South of SR 12, DD-01 drains through marsh into Hill Slough, a tidal slough located \pm 0.15 mile southeast of the BSA. Hill Slough drains to Suisun Slough and Grizzly Bay. Ephemeral roadside ditches (DD-04, DD-05 along Petersen Road) and some seasonal wetlands drain into DD-01 in the BSA. DD-01 also drains urban runoff from development north of the BSA. The ditch is surrounded by chain-link fence. The fence is in disrepair, allowing cattle access to graze the vegetation in and along the ditch. The substrate within DD-01 consists primarily of silt and clay. The concrete box culvert beneath Petersen Road and the culvert beneath the ranch road are armored with rock slope protection (RSP). Some RSP is also present at ranch road culvert crossing.

DD-01 contains freshwater marsh vegetation and hydrology. Vegetation within DD-01 consists of a mixture of cattails (*Typha* sp.), bulrush (*Schoenoplectus acutus*), and other emergent aquatic plants such as water-plantain (*Alisma* sp.), Uruguayan primrose-willow (*Ludwigia hexapetala*), and rushes (*Juncus* sp.). Vegetation on the banks includes bristly ox-tongue (*Helminthotheca echioides*), Bermuda grass (*Cynodon dactylon*), Dallis grass (*Paspalum dilatatum*), perennial pepperweed (*Lepidium latifolium*), and Medusa-head (*Elymus caput-medusae*). There is no riparian tree corridor along DD-01. Portions of the ditch could be classified as *Typha* (*domingensis*, *latifolia*) Herbaceous Alliance (state rarity rank S5 – demonstrably secure statewide) and *Schoenoplectus acutus* Herbaceous Alliance (state rarity rank S4 – apparently secure statewide) based on published alliance descriptions and membership rules (Sawyer et al. 2009; CNPS 2021a). A few isolated riparian trees are present – two ash (*Fraxinus* sp.) are present in the southern portion of the BSA and one white alder (*Alnus rhombifolia*) is present in the northern portion of the BSA. DD-01 is a sensitive wetland community.

DD-02 (Seasonal Wetland)

DD-02 is a man-made drainage ditch with intermittent flow. DD-02 is shown on the Solano HCP City of Suisun City Facilities Map as a drainage channel, and not a realigned creek (SCWA 2012). The ditch is classified as an Order 1 Stream in National Hydrology Dataset (NHD) blue line streams data layer (USGS 2019). During the wet season DD-02 was generally flowing (as a barely discernable trickle). DD-02 dries completely during the summer months. DD-02 enters the site in a concrete box culvert beneath Petersen Road and flows south through the site. The ditch passes through a culvert beneath a ranch road in the

southern portion of the BSA before leaving the site through a culvert beneath SR 12. South of SR 12, DD-02 drains through agricultural lands and marsh into Hill Slough, a tidal slough located \pm 0.15 mile southeast of the BSA. Hill Slough drains to Suisun Slough and Grizzly Bay. Ephemeral roadside ditches (DD-03 and DD-04) drain into DD-02 in the BSA. DD-02 drains urban runoff from development north of the BSA. The ditch is surrounded by chain-link fence. The fence is in disrepair, allowing cattle access to graze the vegetation in and along the ditch. The substrate within DD-02 consists primarily of silt and clay. The concrete box culvert beneath Petersen Road and the culvert beneath the ranch road are armored with RSP. Some RSP is also present at ranch road culvert crossing.

DD-02 contains seasonal wetland vegetation and hydrology. Vegetation within DD-02 consists of water-plantain, Bermuda grass, woolly clover (*Trifolium tomentosum*), bird's-foot trefoil (*Lotus corniculatus*), and rush. Vegetation on the banks includes bristly ox-tongue, Bermuda grass, English plantain (*Plantago lanceolata*), and harding grass (*Phalaris aquatica*). At the southern edge of the BSA adjacent to SR 12 there are a few Lombardy poplar (*Populus nigra*) trees growing along DD-02. No vegetation alliances were recognized within DD-02 as the vegetation is generally nonnative, variable, and of limited extent. DD-2 is a sensitive wetland community.

DD-03 through DD-06 (Roadside Ditches)

DD-03, -04, -05, and -06 are constructed roadside ditches with ephemeral flow that occur along the south side of Petersen Road. Current ditch alignments were excavated in 2015, in association with the widening of Petersen Road. The roadside ditches drain into DD-01 and DD-02 at the northern end of the BSA. The substrate in the ephemeral roadside ditches consists of silts and clays. RSP occurs in the ditches where they flow into DD-01 and DD-02. Metal pipe culverts occur in the roadside ditches beneath several ranch access road driveways off Petersen Road.

No riparian vegetation or wetlands occur in or are associated with the ephemeral roadside ditches. Vegetation in the ephemeral roadside ditches generally includes nonnative annual grasses, similar to surrounding ruderal vegetation on the road shoulder (see description of developed ruderal areas below).

4. Seasonal Wetland

Approximately 14.57 acres of seasonal wetland occur in the BSA (plus an additional 0.65 acre of seasonal wetland within Drainage Ditch DD-02; see Figure 4; Table 5; Appendix D, photos 13-21). Some of the seasonal wetlands occur within the valley floor grassland where ditching, disking, cattle grazing, and cultivation with hay/grain crops has occurred (see description of site disturbance in Section IV.D). Most of the seasonal wetlands occur in the southern third of the BSA as the site transitions to coastal brackish marsh. The source of hydrology for the seasonal wetlands is primarily direct precipitation and sheetflow from the surrounding uplands. Seasonal wetlands near the southern tip of the BSA may also experience saturation or inundation from a seasonally elevated water table (SWCA 2021). No cemented hardpans were observed during soil investigation (SWCA 2021). Most

seasonal wetlands never inundated in 2021 (Table 5) and never or only rarely inundate based on the lack of water observed in historical wet season aerial photographs (a list of the specific seasonal wetlands that contained inundation is in the aquatic resources delineation; SWCA 2021). The seasonal wetlands are generally shallow (in depressions only 1-2 inches deep, or in swales). The seasonal wetlands are grazed by cattle. The seasonal wetlands were often dominated by nonnative plant species, and sometimes varied little in vegetation composition compared with surrounding uplands.

Following the field verification with the Corps, some aquatic resources were added, expanded, or merged into other features. The merged features were assigned a single identifying number, and thus some numbers in the sequence are not used (e.g., SW 09).

Table 5. Aquatic Feature Summary and Characterization

MAIN SITE BSA							
Aquatic Resource	Length (ft)	Avg. Width (ft)	Area (ac)	Inundation Max Depth (in) ¹	Proportion Inundating ²	Apparent Alkalinity ³	Solano HCP Seasonal Wetland Type ⁴
<i>Seasonal Wetland (SW)</i>							
SW 01	--	--	0.28	1.5	± 50%	Low	Pool
SW 02	--	--	0.09	0	0%	Moderate	Mesic Grassland
SW 03	--	--	0.70	4.5	± 5%	Low	Swale
SW 04	--	--	0.09	3.8	± 75%	Low	Pool
SW 05	--	--	0.02	0	0%	Moderate	Mesic Grassland
SW 06	--	--	0.15	0	0%	Moderate	Mesic Grassland
SW 07	--	--	0.13	0	0%	Moderate	Mesic Grassland
SW 08	--	--	0.36	7.7	± 100%	Low	Pool
SW 11	--	--	0.01	0	0%	Low	Mesic Grassland
SW 12	--	--	0.01	0	0%	Low	Mesic Grassland
SW 13	--	--	0.01	0	0%	Low	Mesic Grassland
SW 14	--	--	0.07	2	± 100%	Moderate	Pool
SW 15	--	--	0.02	0	0%	Moderate	Mesic Grassland
SW 16	--	--	0.01	0	0%	Low	Mesic Grassland
SW 17	--	--	0.01	0	0%	Low	Mesic Grassland
SW 18	--	--	0.02	3	± 100%	Low	Pool
SW 19	--	--	0.01	0	0%	Low	Mesic Grassland
SW 20	--	--	0.01	3	± 100%	Moderate	Pool
SW 21	--	--	0.01	0	0%	Low	Mesic Grassland
SW 22	--	--	0.09	0	0%	Moderate	Mesic Grassland
SW 23	--	--	0.01	0	0%	Moderate	Mesic Grassland
SW 24	--	--	0.04	3	± 100%	Moderate	Pool
SW 25	--	--	0.01	4.5	± 100%	Moderate	Pool
SW 26	--	--	0.10	0	0%	Moderate	Alkaline Meadow
SW 27	--	--	0.09	2.5	± 75%	Moderate	Pool
SW 28	--	--	0.61	5.5	± 100%	Low	Pool
SW 29	--	--	0.10	0	0%	Moderate	Mesic Grassland

SW 30	--	--	0.01	1.5	± 100%	Low	Pool
SW 31	--	--	1.36	16+	± 25%	Moderate	Playa Pool (25%) Alkaline Meadow (75%)
SW 32	--	--	0.09	1	± 75%	Moderate	Pool
SW 33	--	--	0.21	2.8	± 100%	Moderate	Pool
SW 34	--	--	< 0.01 ac (52 sf)	3	± 100%	Moderate	Pool
SW 35	--	--	0.01	0	0%	Moderate	Alkaline Meadow
SW 37	--	--	0.01	0	0%	Moderate	Alkaline Meadow
SW 39	--	--	0.09	0	0%	Moderate	Alkaline Meadow
SW 40	--	--	0.03	0	0%	Moderate	Alkaline Meadow
SW 41	--	--	0.02	3.1	± 100%	Moderate	Pool
SW 42	--	--	0.01	2.2	± 100%	Moderate	Pool
SW 43	--	--	< 0.01 ac (195 sf)	1	± 100%	Moderate	Pool
SW 44	--	--	0.02	0	0%	Moderate	Alkaline Meadow
SW 45	--	--	0.06	0	0%	Moderate	Mesic Grassland
SW 46	--	--	0.06	0	0%	High	Alkaline Meadow
SW 47	--	--	1.52	0	0%	Moderate	Swale
SW 48	--	--	7.55	5.5	± 5%	High	Playa Pool (5%) Alkaline Flat (95%)
SW 50	--	--	0.07	0	0%	Low	Mesic Grassland
SW 51	--	--	0.03	0	0%	Low	Mesic Grassland
SW 52	--	--	0.02	0	0%	Low	Mesic Grassland
SW 53	--	--	0.03	0	0%	Low	Mesic Grassland
SW 54	--	--	0.03	0	0%	Low	Mesic Grassland
SW 55	--	--	0.08	0	0%	Low	Mesic Grassland
SW 56	--	--	0.02	0.9	± 100%	Low	Mesic Grassland
SW 57	--	--	0.01	0	0%	Moderate	Mesic Grassland
SW 58	--	--	0.03	0	0%	Moderate	Mesic Grassland
SW 59	--	--	< 0.01 ac (197 sf)	0	0%	Moderate	Alkaline Meadow
SW 60	--	--	< 0.01 ac (203 sf)	0	0%	Moderate	Alkaline Meadow
Total SW in Main BSA	--	--	14.43	--	--	--	--
Brackish Marsh (BM)							
BM 01	--	--	3.07	6.5	± 100%	High	(Not SW)
Total BM in Main BSA	--	--	3.07	--	--	--	--
Drainage Ditch (DD)							
DD 1a	1,956	11.5	0.52	7	± 100%	Low	(Not SW)
DD 1b	1,112	8.4	0.21	10.5	± 100%	Low	(Not SW)
DD 2a	1,956	10.6	0.48	4	± 100%	Low	Swale
DD 2b	642	11.0	0.16	5.5	± 100%	Low	Swale
Total DD in Main BSA	5,666	--	1.37	--	--	--	--

Total Aquatic Resources in Main Site BSA	5,666	--	18.87	--	--	--	--
PETERSEN ROAD OFF-SITE BSA							
<i>Seasonal Wetland (SW)</i>							
SW 49	--	--	0.04	7.5	± 100%	Low	Pool
Total SW in Petersen Road Offsite BSA	--	--	0.04	--	--	--	--
<i>Drainage Ditch (DD)</i>							
DD 1a	14	7.4	< 0.01 ac (103 sf)	--	--	Low	(Not SW)
DD 2a	14	4.9	< 0.01 ac (68 sf)	--	--	Low	Swale
DD 3a	503	2.0	0.02	--	--	Low	(Not SW)
DD 3b	27	1.9	< 0.01 ac (51 sf)	--	--	Low	(Not SW)
DD 4a	574	2.0	0.03	--	--	Low	(Not SW)
DD 4b	22	1.9	< 0.01 ac (41 sf)	--	--	Low	(Not SW)
DD 05	782	2.0	0.04	--	--	Low	(Not SW)
DD 06	75	2.0	< 0.01 ac (150 sf)	--	--	Low	(Not SW)
Total DD in Petersen Road Offsite BSA	2,011	--	0.10	--	--	--	--
Total Aquatic Resources in Petersen Road Offsite BSA	2,011	--	0.14	--	--	--	--
STATE ROUTE 12 OFF-SITE BSA							
<i>Seasonal Wetland (SW)</i>							
SW 19	--	--	< 0.01 ac (37 sf)	0	0%	Low	Mesic Grassland
SW 28	--	--	< 0.01 ac (200 sf)	5.5	± 100%	Low	Pool
SW 48	--	--	0.09	5.5	± 5%	High	Playa Pool (5%) Alkaline Flat (95%)

Total SW in State Route 12 Offsite BSA	--	--	0.10	--	--	--	--
Brackish Marsh (BM)							
BM 01	--	--	0.29	6.5	± 100%	High	
Total BM in State Route 12 Offsite BSA	--	--	0.29	--	--	--	-
Drainage Ditch (DD)							
DD 1b	38	10.3	0.01	10.5	± 100%	Low	--
DD 2b	44	9.2	0.01	5.5	± 100%	Low	
Total DD in State Route 12 Offsite BSA	82	--	0.02	--	--	--	--
Total Aquatic Resources in State Route 12 Offsite BSA	82	--	0.41	--	--	--	--

¹ Inundation Max Depth was measured by a biologist using a yard stick placed vertically in the deepest portion of the wetland. Max depth was assessed on November 4th, 2021, approximately 10 days after a large storm delivered over 6 inches of rain to the region. Smaller rain events occurred after the storm and before the depth was assessed, including one rain event the night of November 3rd.

² Proportion Inundating was estimated based on of the maximum extent of inundation observed in the wetland features across fieldwork and in aerial photographs available in Google Earth. The percentage reflects the approximate proportion of the feature that experiences inundation. Most features experience no inundation. A few features inundate only in a small portion of the area they occupy (SW-03, -31, and -48 in particular).

³ Apparent Alkalinity was estimated based on the preponderance of halophytic (salt-loving) plants, barren soils, and/or salt-crusts soils within aquatic features, and aerial photographs. Indicators of higher salinity/alkalinity increase as one moves south across the site. The highest alkalinity with barren soils was observed only in the southernmost wetlands near SR 12.

⁴ The Draft Solano HCP (SCWA 2012) classifies seasonal wetlands into the following four types:

Pools: Greater than 1 inch of standing water for more than 10 continuous days with short (less than 3 weeks) to long (more than 3 weeks) durations of standing water, clear to moderate turbidity, and exhibiting significant vegetation cover.

Playa Pools: Greater than 1 inch of standing water for more than 10 continuous days with long (more than 3 weeks) to very long durations; often referred to as playa-type pools).

Swales or Mesic Grassland: Shallow, standing water (generally less than 1 inch) present for fewer than 10 continuous days.

Alkaline Flats and Meadows: Shallow, standing water (generally less than 1 inch) present for fewer than 10 continuous days and exhibiting indicators of high alkalinity (salt deposits on soil surface, presence of salt-tolerant plants).

The seasonal wetlands located within the cultivated fields were generally dominated by wheat (planted in 2020), rye grass, pappose tarplant, and/or buttercup (*R. muricatus*). Other plants observed in the seasonal wetlands located within the cultivated fields included prickly lettuce, Mediterranean barley, coyote thistle, alkali weed, bindweed, salt grass, cocklebur (*Xanthium strumarium*), hayfield tarweed, oat, vetch (*Vicia sativa*); storksbill, brass buttons (*Cotula coronopifolia*), woolly marbles (*Psilocarphus* sp.); clover (*Trifolium* spp.), willowherb (*Epilobium ciliatum*), common sow thistle (*Sonchus oleraceus*), and bird's-foot trefoil. The seasonal wetlands located south of and outside the cultivated fields varied in floral composition. Dominants observed in these wetlands often included brass buttons, rye grass, saltgrass, pappose tarplant, buttercup, Mediterranean barley, alkali heath, coyote thistle, silver hair grass (*Aira caryophylla*), rabbit's foot grass (*Polypogon monspeliensis*), and rarely semaphore grass (*Pleuropogon californicus*), manna grass (*Glyceria* sp.), and Fremont's goldfields (*Lasthenia fremontii*).

The vegetation in seasonal wetlands varies and individual seasonal wetlands may be classified as *Festuca perennis* Semi-Natural Alliance (no rarity rank), *Distichlis spicata* Herbaceous Alliance (state rank S4 – apparently secure statewide), *Centromadia parryi* Herbaceous Alliance (state rarity rank S2 – imperiled statewide), *Atriplex prostrata* – *Cotula coronopifolia* Herbaceous Semi-Natural Alliance (no rarity rank), and *Cressa truxillensis* – *Distichlis spicata* Herbaceous Alliance (state rarity rank S2 – imperiled statewide) based on published alliance descriptions and membership rules (Sawyer et al. 2009; CNPS 2021a). The *Centromadia parryi* alliance is described with the valley floor grassland above and shown as population polygons on Figure 5. The *Cressa truxillensis* – *Distichlis spicata* alliance occurred only in the southernmost seasonal wetlands (located in or south of the alkali meadow).

5. Coastal Brackish Marsh

Approximately 3.36 acres of coastal brackish marsh occurs in the southeast corner of the BSA (Figure 4; Appendix D, photos 24-25). The marsh drains to the south through a culvert that passes beneath SR 12 and drains to Hill Slough, Suisun Slough, and ultimately Grizzly Bay. Inundation was observed in the coastal marsh on all fieldwork days. The marsh appears to dry up completely in some dry-season historic aerial photos. Small fish about 1 inch in length were observed in the coastal brackish marsh during fieldwork in October 2020. Maximum inundation depths of 4 inches and 6.5 inches were recorded in the marsh on November 4, 2021 (Table 5). The brackish marsh is grazed by cattle.

Along its periphery, vegetation in the coastal brackish marsh is dominated by rushes (*Juncus* spp.) and common spikerush (*Eleocharis macrostachya*). The interior/southern portions of marsh are dominated by bulrush (*Schoenoplectus acutus*) and cattail (*Typha* sp.). Halophytes occur in the areas surrounding the brackish marsh, including alkali heath (*Frankenia salina*), salt grass (*Distichlis spicata*), sickle grass (*Parapholis incurva*), and saline clover (*Trifolium hydrophilum*). Portions of the coastal brackish marsh could be classified as *Typha* (*domingensis*, *latifolia*) Herbaceous Alliance (state rarity rank S5 – demonstrably secure statewide) and *Schoenoplectus acutus* Herbaceous Alliance (state rarity rank S4 – apparently

secure statewide) based on published alliance descriptions and membership rules (Sawyer et al. 2009; CNPS 2021a). The coastal brackish marsh is a sensitive wetland community.

6. Developed (Ruderal)

Approximately 2.89 acres of developed (ruderal) land occurs in the BSA (Figure 4). The area occurs only along disturbed road shoulders in off-site portions of the BSA (0.87 acre in the Peterson Road ROW and 2.02 acres in the SR 12 ROW). Vegetation on road shoulders is managed (mowed and/or treated with herbicide). This community is dominated by nonnative weedy species including Italian rye grass, brome fescue (*Festuca bromoides*), ripgut brome (*Bromus diandrus*), soft chess, oat, knotweed (*Polygonum aviculare* ssp. *depressum*), field mustard (*Brassica rapa*), radish (*Raphanus sativus*), common sow thistle, and rose clover (*Trifolium hirtum*). Vegetation generally exceeds 10% absolute cover.

7. Developed (Hardscape)

Approximately 0.71 acre of developed (hardscape) land occurs in the BSA (Figure 4). The developed (hardscape) land occurs only on disturbed road shoulders in off-site portions of the BSA (0.20 acre in the Peterson Road ROW and 0.51 acre in the SR 12 ROW). Vegetation is generally absent in the areas classified as developed (hardscape).

D. The Existing Level of Disturbance

Current site conditions are shown on the aerial photograph in Figure 2 and in photographs in Appendix D. Site topography, drainage, vegetation, and soils have been disturbed by ongoing agricultural land use, road development, and ditching. Over 125 years ago, the construction of (now) Petersen Road and the two north/south ditches permanently altered how water flowed across the site (Petersen Road was the original alignment of State Route 12). Construction of Petersen Road effectively cut off the top of the watershed that once flowed across the site from north to south. Water sheet flowing southward toward the site now enters the roadside ditches along Petersen Road and flows into north-south aligned ditches (DD-01 and DD-02).

Approximately 540 feet south of Petersen Road there is an underground gas line that was installed some time prior to 1952. SR 12 (current location) was constructed just south of the site by 1962. Between 1968 and 1993 the two north/south ditches were widened, and the eastern ditch was channelized with a curved alignment to match to the SR 12 culvert. A residential subdivision north of the BSA was constructed in the mid-1980s.

Livestock grazing of the BSA has been ongoing for decades. The BSA was being grazed by an estimated 200 cattle during fieldwork. A livestock corral occurs at the northeast corner of the BSA. A couple water troughs are present, but cattle were observed drinking primarily from the north-south aligned ditches. Aerial photographs from the 1960's show some trenching or furrowing in the fields, likely associated with efforts to improve field drainage to increase agricultural productivity. Beginning in 2015, aerial photographs show evidence of disking or planting of dryland forage crops in the northern portion of the BSA, and on the

parcel just east of the BSA. In 2020, the northern two-thirds of the site was planted with wheat. In 2021, no planting or harvesting occurred in the BSA in order to facilitate the delineation.

Vegetation on road shoulders is managed (mowed and/or treated with herbicide). The frequency of the ditch vegetation maintenance is unknown. At the southern edge of the BSA there is a tilled fire break along the north side of SR 12. The southeast corner of the site burned in a grassfire in October 2020. Concrete foundations of former structures occur in the southeast portion of the BSA. Minor amounts of debris (wind-blown trash, discarded tires, etc.) occur scattered throughout the BSA.

V. BIOLOGICAL RESOURCES IN THE STUDY AREA

A. Determination of Special-Status Species in the Study Area

USFWS file data, CNDDDB/CNPS records, and field surveys were used to determine the special-status species that could occur in the BSA. Field surveys were conducted to determine whether habitat for special-status species identified in the file data is present in the BSA, as described in Section III. Special-status species with suitable habitat in the BSA are listed in Table 6.

Table 6. Special-Status Species and Natural Communities with Potential to Occur.

Special-Status Species	Common Name	Federal Status ¹	State Status ^a & other codes ²	Habitat Present? / Species Observed?
Invertebrates				
<i>Branchinecta conservatio</i>	Conservancy fairy shrimp	CH, E	--	Yes/No
<i>Branchinecta lynchi</i>	Vernal pool fairy shrimp	CH, T	--	Yes/No
<i>Danaus plexippus plexippus</i>	Monarch butterfly	C	--	Yes/No
<i>Elaphrus viridis</i>	Delta green ground beetle	CH, T	--	Yes/No
<i>Hydrochara rickseckeri</i>	Ricksecker's water scavenger beetle	--	--	Yes/No
<i>Lepidurus packardii</i>	Vernal pool tadpole shrimp	CH, E	--	Yes/No
Amphibians				
<i>Ambystoma californiense</i>	California tiger salamander, Central California DPS	CH, T	T	Yes/No
Reptiles				
<i>Emys marmorata</i>	Western pond turtle	--	SSC	Yes/No
Birds				
<i>Agelaius tricolor</i>	Tricolored blackbird	--	T	Yes/No
<i>Ammodramus savannarum</i>	Grasshopper sparrow	--	SSC	Yes/No
<i>Aquila chrysaetos</i>	Golden eagle	--	FP	Yes/No
<i>Asio flammenus</i>	Short-eared owl	--	SSC	Yes/No
<i>Athene cunicularia</i>	Burrowing owl	--	SSC	Yes/No
<i>Buteo swainsoni</i>	Swainson's hawk	--	T	Yes/No
<i>Circus cyaneus</i>	Northern Harrier	--	SSC	Yes/Yes
<i>Charadrius montanus</i>	Mountain plover	--	SSC	Yes/No
<i>Coturnicops noveboracensis</i>	Yellow rail	--	SSC	Yes/No
<i>Elanus leucurus</i>	White-tailed kite	--	FP	Yes/No
<i>Lanius ludovicianus</i>	Loggerhead shrike	--	SSC	Yes/Yes
<i>Laterallus jamaicensis coturniculus</i>	California black rail	--	T	Yes/No
<i>Melospiza melodia maxillaris</i>	Suisun song sparrow	--	SSC	Yes/No
<i>Xanthocephalus xanthocephalus</i>	Yellow-headed blackbird	--	SSC	Yes/No
Nesting Birds (MBTA or CA FGC regulated)		--	--	Yes/Yes
Mammals				
<i>Reithrodontomys raviventris</i>	Salt marsh harvest mouse	E	E	Yes/No
<i>Sorex ornatus sinuosus</i>	Suisun shrew	--	SSC	Yes/No
<i>Taxidea taxus</i>	American badger	--	SSC	Yes/No
Plants / CNPS List ^b				
<i>Astragalus tener var. ferrisiae</i>	Ferris' milk-vetch	--	--/1B.1	Yes/No

Special-Status Species	Common Name ^a	Federal Status ¹	State Status & other codes ²	Habitat Present? / Species Observed?
<i>Astragalus tener</i> var. <i>tener</i>	Alkali milk-vetch	--	--/1B.2	Yes/No
<i>Atriplex cordulata</i> var. <i>cordulata</i>	Heartscale	--	--/1B.2	Yes/No
<i>Atriplex depressa</i>	Brittlescale	--	--/1B.2	Yes/No
<i>Atriplex persistens</i>	Vernal pool smallscale	--	--/1B.2	Yes/No
<i>Blepharizonia plumosa</i>	Big tarplant	--	--/1B.1	Yes/No
<i>Carex lyngbyei</i>	Lyngbye's sedge	--	--/2B.2	Yes/No
<i>Centromadia parryi</i> ssp. <i>congdonii</i>	Congdon's tarplant	--	--/1B.1	Yes/No
<i>Centromadia parryi</i> ssp. <i>parryi</i>	Pappose tarplant	--	--/1B.2	Yes/Yes
<i>Chloropyron molle</i> ssp. <i>hispidum</i>	Hispid salty bird's-beak	--	--/1B.1	Yes/No
<i>Chloropyron molle</i> ssp. <i>molle</i>	Soft salty bird's-beak	CH, E	R/1B.2	Yes/No
<i>Cicuta maculata</i> var. <i>bolanderi</i>	Bolander's water-hemlock	--	--/2B.1	Yes/No
<i>Cirsium hydrophilum</i> var. <i>hydrophilum</i>	Suisun thistle	CH, E	--1B.1	Yes/No
<i>Delphinium recurvatum</i>	Recurved larkspur	--	--/1B.2	Yes/No
<i>Downingia pusilla</i>	Dwarf downingia	--	--/2B.2	Yes/No
<i>Eryngium jepsonii</i>	Jepson's coyote-thistle	--	--/1B.2	Yes/No
<i>Eschscholzia rhombipetala</i>	Diamond-petaled California poppy	--	--/1B.1	Yes/No
<i>Extriplex joaquinana</i>	San Joaquin spearscale	--	--/1B.2	Yes/No
<i>Gratiola heterosepala</i>	Boggs Lake hedge-hyssop	--	E/1B.2	Yes/No
<i>Hesperovax caulescens</i>	Hogwallow starfish	--	--/4.2	Yes/No
<i>Hibiscus lasiocarpus</i> var. <i>occidentalis</i>	Woolly rose-mallow	--	--/1B.2	Yes/No
<i>Isocoma arguta</i>	Carquinez goldenbush	--	--/1B.1	Yes/No
<i>Lasthenia chrysantha</i>	Alkali-sink goldfields	--	--/1B.1	Yes/No
<i>Lasthenia conjugens</i>	Contra Costa goldfields	CH, E	--/1B.1	Yes/No
<i>Lasthenia ferrisiae</i>	Ferris' goldfields	--	--/4.2	Yes/No
<i>Lasthenia glabrata</i> ssp. <i>coulteri</i>	Coulter goldfields	--	--/1B.1	Yes/No
<i>Lathyrus jepsonii</i> var. <i>jepsonii</i>	Delta tule pea	--	--/1B.2	Yes/No
<i>Legenere limosa</i>	Legenere	--	--/1B.1	Yes/No
<i>Lepidium latipes</i> var. <i>heckardii</i>	Heckard's pepper-grass	--	--/1B.2	Yes/No
<i>Madia radiata</i>	Showy golden madia	--	--/1B.1	Yes/No
<i>Microseris paludosa</i>	Marsh microseris	--	--/1B.2	Yes/No
<i>Navarretia leucocephala</i> ssp. <i>bakeri</i>	Baker's navarretia	--	--/1B.1	Yes/No
<i>Neostapfia colusana</i>	Colusa grass	CH, T	E/1B.1	Yes/No
<i>Orcuttia inaequalis</i>	San Joaquin Valley Orcutt grass	CH, T	E/1B.1	Yes/No
<i>Plagiobothrys hystriculus</i>	Bearded popcorn flower	--	--/1B.1	Yes/No
<i>Puccinellia simplex</i>	California alkali grass	--	--/1B.2	Yes/No
<i>Spergularia macrotheca</i> var. <i>longistyla</i>	Long-styled sand-spurrey	--	--/1B.2	Yes/No
<i>Stuckenia filiformis</i> ssp. <i>alpina</i>	Slender-leaved pondweed	--	--/2B.2	Yes/No

Special-Status Species	Common Name	Federal Status ¹	State Status & other codes ²	Habitat Present? / Species Observed?
<i>Symphotrichum lentum</i> (syn. <i>Aster lentus</i>)	Suisun Marsh aster	--	--/1B.2	Yes/No
<i>Trifolium hydrophilum</i>	Saline clover	--	--/1B.2	Yes/Yes
<i>Tuctoria mucronata</i>	Solano grass	CH, E	E/1B.1	Yes/No

¹ **Listing Status:** Federal status determined from USFWS letter. State status determined from CDFW (2021b-e). Codes used in table are: E = Endangered; T = Threatened; P = Proposed; C = Candidate; R = California Rare; * = Possibly extinct.

² **Other Codes:** Other codes determined from USFWS letter; CDFW (2021b-e). Codes used in table are as follows:
 SSC = CDFW Species of Special Concern; FP = CDFW Fully Protected; Prot = CDFW Protected; CH = Critical habitat designated.
 CNPS List (plants only): 1A = Presumed Extinct in CA; 1B = Rare or Endangered (R/E) in CA and elsewhere; 2 = R/E in CA and more common elsewhere; 3 = Need more information; 4 = Plants of limited distribution
 CNPS List Decimal Extensions: .1 = Seriously endangered in California (over 80% of occurrences threatened / high degree and immediacy of threat); .2 = Fairly endangered in CA (20-80% of occurrences threatened); .3 = Not very endangered in CA (< 20% of occurrences threatened or no current threats known).

B. Special-Status Species not in the Study Area

Special-status species that occur in the nine quadrangle search area but for which suitable habitat is not present, or whose distributional limits preclude the possibility of their occurrence in the BSA, are not discussed in Section V of this report. An evaluation of these species is in Appendix B.

C. Evaluation of Special-Status Wildlife

1. Invertebrates

Conservancy fairy shrimp (*Branchinecta conservatio*)

HABITAT AND BIOLOGY: Conservancy fairy shrimp is federally listed as endangered. It typically inhabits relatively large and turbid vernal pools, often referred to as playa pools. Playa pools often remain inundated much longer than typical vernal pools and are typically greater than 200 feet in diameter (USFWS 2012). Conservancy fairy shrimp hatch out of tiny cysts within the soil during the first winter rains, and complete their entire life cycle by early summer. (USFWS 2012). Conservancy fairy shrimp have been observed at elevations ranging from 16 to 5,577 feet (Eriksen and Belk 1999 in USFWS 2005), and at water temperatures as high as 73°F (Syrdahl 1993 in USFWS 2005). Hatching can begin within the same week that a pool starts to fill. Average time to maturity is 49 days. In warmer pools, it can be as little as 19 days (71 FR 7118 7316).

RANGE: Conservancy fairy shrimp are endemic to vernal pools in California. Conservancy fairy shrimp are known from 10 populations: 1) Vina Plains, Butte and Tehama counties; 2) Sacramento National Wildlife Refuge, Glenn County; 3) Mariner Ranch, Placer County; 4) Yolo Bypass Wildlife Area, Yolo County; 5) Jepson Prairie, Solano County; 6) Mapes Ranch, Stanislaus County; 7) University of California, Merced, Merced County; 8) the Highway 165 area, Merced County; 9) Sandy Mush Road, Merced County; and 10) Los Padres National Forest, Ventura County (USFWS 2012).

CRITICAL HABITAT: Critical habitat for conservancy fairy shrimp was designated in 2006 (71 FR 7118 7316). The BSA contains federal designated critical habitat for conservancy fairy shrimp. The critical habitat occurs in the approximately the eastern half of the BSA. The primary constituent elements (physical and biological features) essential for the species are: 1) Topographic features characterized by mounds and swales and depressions within a matrix of surrounding uplands that result in complexes of continuously, or intermittently, flowing surface water in the swales connecting the pools, providing for dispersal and promoting hydroperiods of adequate length in the pools; 2) Depressional features including isolated vernal pools with underlying restrictive soil layers that become inundated during winter rains and that continuously hold water for a minimum of 19 days, in all but the driest years (average time to maturity is 49 days); thereby providing adequate water for incubation, maturation, and reproduction. As these features are inundated on a seasonal basis, they do not promote the development of obligate wetland vegetation habitats typical of permanently flooded emergent wetlands, 3) Sources of food, expected to be detritus occurring in the pools, contributed by overland flow from the pools' watershed, or the results of biological processes within the pools themselves, such as single-celled bacteria, algae, and dead organic matter, to provide for feeding; and 4) Structure within the pools described above, consisting of organic and inorganic materials, such as living and dead plants from plant species adapted to seasonally inundated environments, rocks, and other inorganic debris that may be washed, blown, or otherwise transported into the pools, that provide shelter.

KNOWN RECORDS: There are 13 CNDDDB records of conservancy fairy shrimp within the 9-quad area surrounding the BSA. The closest record (Occurrence #14) is approximately 0.9 mile south of the BSA in the vicinity of the Potrero Hills Landfill, southeast of Fairfield. A total of 6 conservancy fairy shrimp were dip netted and released in the artificial drainage ditches connected to large vernal pools to the east. The drainage ditches were vegetated with *Salicornia* sp. and *Typha* sp.

HABITAT PRESENT IN THE BSA: The deeper, more frequently inundated seasonal wetlands in the southern portion of the BSA near SR 12 may provide suitable habitat for this species.

DISCUSSION: No Conservancy fairy shrimp (or fairy shrimp of any species) were observed during the general biological surveys in 2021. Conservancy fairy shrimp require pools that are inundated for at least 19 consecutive days, and an average of 49 days, or through June and into July. Within the BSA, only the deeper, larger southernmost seasonal wetlands nearest to SR 12 potentially inundate for sufficient duration (southern portions of SW 31 and SW 48; Figure 4; Table 5). Based on hydrology monitoring conducted in the winter and spring of 2021, and an evaluation of historic aerial photographs, inundation is rarely present in the seasonal wetlands in the northern two-thirds of the BSA (Table 5). The seasonal wetlands in the northern two-thirds of the BSA are shallow and much smaller than the pools known to support the species. The population at Jepson Prairie (approximately 8.5 miles northeast of the BSA) occurs in larger and long-inundated playa-type depressions that are not found in the BSA. The analysis in the Draft Solano HCP (SCWA 2012) states that "Conservancy fairy shrimp occur exclusively within large playa type vernal pools in the valley grasslands and vernal pools natural community." The BSA occurs in designated

critical habitat for the species. The physical and biological features identified as essential for the species in the critical habitat designation are generally absent or degraded in the northern two-thirds of the site.

Vernal pool fairy shrimp (*Branchinecta lynchi*)

HABITAT AND BIOLOGY: Vernal pool fairy shrimp is federally listed as threatened. They occur primarily in vernal pools, seasonal wetlands, and similar aquatic features that fill with water during fall and winter rains and dry up in spring and summer. They are most commonly found in small (less than 0.05 acre), clear to tea-colored vernal pools with mud, grass, or basalt bottoms in unplowed grasslands (USFWS 2005b). When aquatic habitat dries, offspring persist as cysts (desiccation-resistant embryos) in the pool substrate until the return of winter rains and appropriate temperatures allow some of the cysts to hatch. Cysts require water temperatures of 50° F or lower to hatch (USFWS 2007a). Vernal pool fairy shrimp have been found in pools with water temperatures between 40 and 73 °F. Immature and adult shrimp perish when water temperatures rise to approximately 75 °F (USFWS 2007a). The vernal pool fairy shrimp can reach sexual maturity in as few as 18 days at optimal conditions of 68 degrees °F and can complete its life cycle in as little as 9 weeks (USFWS 2005b). Although there are many observations of the environmental conditions where vernal pool fairy shrimp have been found, there have been no experimental studies investigating the specific habitat requirements of this species (USFWS 2005b).

RANGE: Vernal pool fairy shrimp are known to occur from Shasta County south through the Central Valley. They also occur in the Coast Range from Solano County south to San Benito County. Other populations are known from San Luis Obispo, Santa Barbara, and Riverside counties, and Jackson County of southern Oregon (USFWS 2005b). Inhabited pools occur at elevations ranging from approximately 33 to 4,000 feet (Eriksen and Belk 1999). However, some records close to the BSA occur at approximately 22 feet elevation (e.g., CNDDDB Occurrence #666).

CRITICAL HABITAT: Critical habitat for vernal pool fairy shrimp was designated in 2006 (71 FR 7118 7316). The BSA contains federal designated critical habitat for vernal pool fairy shrimp. The critical habitat occurs throughout the entire BSA. The primary constituent elements (physical and biological features) essential for the species are: 1) Topographic features characterized by mounds and swales and depressions within a matrix of surrounding uplands that result in complexes of continuously, or intermittently, flowing surface water in the swales connecting the pools described below, providing for dispersal and promoting hydroperiods of adequate length in the pools; 2) Depressional features including isolated vernal pools with underlying restrictive soil layers that become inundated during winter rains and that continuously hold water for a minimum of 18 days, in all but the driest years; thereby providing adequate water for incubation, maturation, and reproduction. As these features are inundated on a seasonal basis, they do not promote the development of obligate wetland vegetation habitats typical of permanently flooded emergent wetlands; 3) Sources of food, expected to be detritus occurring in the pools, contributed by overland flow from the pools' watershed, or the results of biological processes within the pools themselves, such as

single-celled bacteria, algae, and dead organic matter, to provide for feeding; and 4) Structure within the pools described above, consisting of organic and inorganic materials, such as living and dead plants from plant species adapted to seasonally inundated environments, rocks, and other inorganic debris that may be washed, blown, or otherwise transported into the pools, that provide shelter.

KNOWN RECORDS: There are 22 CNDDDB records of vernal pool fairy shrimp within the 9-quad area surrounding the BSA. The closest record (Occurrence #666) is approximately 0.96 mile northeast of the BSA on the southwest side of Travis Air Force Base, 1.3 miles east of Walters Road and east of Suisun City. In 2008, hundreds of vernal pool fairy shrimp were found in the vernal pools near a rural residential neighborhood.

HABITAT PRESENT IN THE BSA: The deeper, more frequently inundated seasonal wetlands may provide suitable habitat for this species.

DISCUSSION: No vernal pool fairy shrimp (or fairy shrimp of any species) were observed during the general biological surveys in 2021. Within the BSA, only the deeper seasonal wetlands potentially inundate for duration sufficient for reproduction. Based on hydrology monitoring conducted in the winter and spring of 2021, and inundation depths assessed on November 4, 2021, 10 days after a large storm delivered over 6 inches of precipitation to the area on October 24, 2021, only the following seasonal wetlands contain sufficient inundation to provide potential habitat for vernal pool fairy shrimp: SW 01, SW 04, SW 08, SW 14, SW 18, SW 20, SW 24, SW 25, SW 27, SW 28, SW 30, SW 31 (southern portion), SW 32, SW 33, SW 34, SW 41, SW 42, SW 43, SW 48 (southern portion), and SW 49 (Table 5). Most of the seasonal wetlands in the northern two-thirds of the BSA are swale-like and generally lack inundation even following storm events (Table 5). The BSA occurs in designated critical habitat for the species. The physical and biological features identified as essential for the species in the critical habitat designation are absent or degraded in the northern two-thirds of the site.

Monarch butterfly (*Danaus plexippus plexippus*)

HABITAT AND BIOLOGY: Preferred monarch habitat is filled with diverse nectar sources which support monarchs and native bees. Native milkweeds (*Asclepias* sp.) and other nectar sources provide monarchs with breeding habitat, resting and refueling stops during migration, and food at the overwintering sites (USFWS 2020). Overwintering habitats are comprised of tree groves that typically occur within 1.5 miles of the Pacific coastline, or within the San Francisco Bay area, where the proximity to large water bodies moderates temperature fluctuations. Suitable grove conditions include temperatures above freezing, high humidity, dappled sunlight, access to water and nectar, and protection from high winds and storms. Monarchs will select the native Monterey pine, Monterey cypress, western sycamore, and other native tree species when they are available, but will also utilize non-native eucalyptus species if other optimal habitat conditions are met. During breeding season in the late spring and summer, female monarch butterflies will lay their eggs on the underside of young leaves or flower buds of milkweeds, caterpillars then hatch within 3-5 days and begin to feed on milkweed leaves that provide energy and protective toxic

compounds that protect the caterpillars from predation. Within a month, the caterpillars will grow, produce a chrysalis, and emerge as fully formed adult butterflies (WAFWA 2019).

RANGE: The western population of the monarch butterfly typically breeds and forages west of the Rocky Mountains in the spring and summer, and then migrates to the wooded groves along the California coast in the late summer and fall to their generational overwintering sites. Western monarchs typically reach their overwintering sites in coastal California and Baja California in September and October and remain there until early spring (WAFWA 2019).

KNOWN RECORDS: There is 1 CNDDDB record of monarch butterfly within the 9-quad area surrounding the BSA. The record (Occurrence #23) is from 1979, approximately 4 miles west of the BSA on the west side of Fairfield. Monarchs were overwintering in a row of eucalyptus trees. Monarch butterflies are known to occur the vicinity and would be expected to forage in and migrate through the area on their way to coastal overwintering habitat.

HABITAT PRESENT IN THE BSA: A few narrow-leaf milkweed (*Asclepias fascicularis*) plants were observed in the valley floor grassland.

DISCUSSION: No monarch butterflies of any life stage were observed in the BSA during biological surveys. A few stunted narrow-leaf milkweed plants were observed in the disked valley floor grassland. The plants are unlikely to provide sufficient food resources to support larval development and metamorphosis. No overwintering habitat occurs in the BSA. There is no shelter from high winds that frequent the area.

Delta green ground beetle (*Elaphrus viridis*)

HABITAT AND BIOLOGY: Delta green ground beetle is federally listed as threatened. It was formally known only from a single museum specimen until the species was rediscovered in the wild in 1974, at the Jepson Prairie in Solano County, California. Much about its life cycle and habitat affinities remains unknown. Adults emerge from a period of dormancy or delayed development and females lay their eggs in early winter. Active adults reappear the following winter. As vernal pool habitats become dry, the beetle larvae crawl into cracks in the soil, and survive the hot, dry summer and fall as diapausing pupae. The beetle is typically found along the margins of vernal pools and in bare areas along trails and roadsides, where individuals often hide in cracks in the mud and under low-growing vegetation (USFWS 2009). The habitat characteristics most strongly associated with the beetle's presence include *Navarretia* cover, proximity to water, *Frankenia* cover, *Downingia* cover, soil type, and cracks in the soil (USFWS 2009).

RANGE: All known delta green ground beetle occurrences occur near the Jepson Prairie Preserve in the Solano-Colusa vernal pool region (USFWS 2009).

CRITICAL HABITAT: Critical habitat for delta green ground beetle was designated in 1980 (45 FR 52807 52810). The BSA does not contain federal designated critical habitat for delta green ground beetle. The nearest critical habitat occurs approximately 8.4 miles northeast.

KNOWN RECORDS: There are 7 CNDDDB records of delta green ground beetle within the 9-quad area surrounding the BSA. The closest record (Occurrence #7) is approximately 4.1 miles northeast of the BSA, about 0.36 mile east of Travis Air Force Base. The record is for a number of delta green ground beetles observed on the edges of vernal pools in 2002.

HABITAT PRESENT IN THE BSA: The deeper, more frequently inundated seasonal wetlands in the southern portion of the BSA near SR 12 and adjacent uplands may provide suitable habitat for this species.

DISCUSSION: No potential delta green ground beetle individuals were observed during the general biological surveys in 2021. Within the BSA, only the deeper, larger southernmost seasonal wetlands nearest to SR 12 (southern portions of SW 31 and SW 48) and adjacent uplands provide potential suitable habitat (Figure 4; Table 5). The analysis in the Draft Solano HCP (SCWA 2012) states that “delta green ground beetles occur exclusively along the edges of large vernal pools in the Valley Floor Grasslands and Vernal Pools Natural Community.” Based on hydrology monitoring conducted in the winter and spring of 2021, and an evaluation of historic aerial photographs, inundation is rarely present in the seasonal wetlands in the northern two-thirds of the BSA (Table 5). The seasonal wetlands in the northern two-thirds of the BSA are shallow and much smaller than the pools known to support the species. The population at Jepson Prairie (approximately 8.5 miles northeast of the BSA) occurs in larger and long-inundated playa-type depressions that are not found in the BSA.

In 2007, species expert Richard Arnold, PhD, conducted a habitat assessment for delta green ground beetle on the land immediately west of the BSA (the Walmart site west of Walters Road). Conditions on that site were similar to those within the BSA, with valley floor grassland and shallow seasonal wetlands. The assessment examined vegetation and soils, particularly the extent of Pescadero clay soils and wetlands on that soil type. The assessment concluded that the property did not support suitable habitat for the beetle, and the beetle was unlikely to occur (Entomological Consulting 2007).

Pescadero clay soils occur only along the southern edge of the BSA, and to a lesser extent than the site located immediately west of the BSA (Figure 3). No *Navarretia* (*Navarretia* spp.) plants were observed in the BSA during protocol botanical surveys. Only a few *Downingia* (*Downingia concolor* var. *concolor*) plants were observed. *Frankenia salina* is fairly abundant in the southern portion of the BSA in the alkali meadow and seasonal wetlands located in the alkali meadow, and absent or very uncommon in the valley floor grassland. Similar to the site to the west, there is no suitable habitat for the delta green ground beetle in the northern two thirds of the BSA. It is unknown if the larger pools at the southern end of SW 31 and SW 48 provide potential habitat for the beetle. Suitability of those pools may be constrained by saline influence, high water table, and other factors. The limited extent of potential habitat and distance to the known and highly restricted range of the beetle make it unlikely that delta green ground beetle would occur in the BSA.

Ricksecker's water scavenger beetle (*Hydrochara rickseckeri*)

HABITAT AND BIOLOGY: Ricksecker's water scavenger beetle (RWSB) depends on vernal pool wetland ecosystems. They require seasonally inundated vernal pools and depressional wetlands that remain inundated for a minimum of 18 days in all but the driest years (SSHCP 2018). Collection records suggest that the RWSB is not sensitive to the size of vernal pools or other aquatic habitats, and primarily utilizes vernal pools and swales, seasonal wetlands and other ephemeral habitats, as well as constructed vernal pools. Larvae are predatory, indiscriminately attacking and consuming prey equal or smaller in size, including other insects, crustaceans, amphibian larvae, and conspecific larvae. Adults are omnivorous and feed on common frog-fruit (*Phyla nodiflora*), and dead insects and tadpoles. Early instar larvae appear in pools 3 to 4 weeks after the first inundation. When temperatures begin to rise (typically March) the late instar larvae leave the pool and construct a burrow in the adjacent uplands, typically where the soil is slightly moist, and pupate therein. Pupation lasts 2 to 4 days. Following pupation, adults emerge and fly to a different vernal pool to mate. Oviposition is thought to occur at the water surface, in vegetation (SSHCP 2018).

RANGE: This species was originally described as endemic to the San Francisco Bay region, but recent collections have been made in Solano County and from vernal pools in Sacramento and Placer counties. In the Central Valley suitable habitat occurs below 980 feet (SSHCP 2018).

KNOWN RECORDS: There are 3 CNDDDB records for RWSB in the nine-quad area centered on the BSA. The closest record (Occurrence #13) is located about 4.3 miles northeast of the BSA, along the north side of Travis AFB. The record is based on 10 adults and numerous larvae observed in linear vernal pools and seasonal wetlands along the Sacramento Northern Railroad right-of-way, between Meridian Road and Rt 113.

HABITAT PRESENT IN THE BSA: The valley floor grassland, seasonal wetlands, and alkali meadow provide potential habitat for RWSB.

DISCUSSION: No RWSB individuals were observed during biological surveys. Habitat quality is low in the northern portion of the BSA subject to dryland farming. Few of the seasonal wetlands in the northern portion of the BSA provide inundation of sufficient duration for reproduction. Only the deeper seasonal wetlands potentially inundate for duration sufficient for reproduction. Based on hydrology monitoring conducted in the winter and spring of 2021, and inundation depths assessed on November 4, 2021, 10 days after a large storm delivered over 6 inches of precipitation to the area on October 24, 2021, the following seasonal wetlands contain sufficient inundation to provide potential breeding habitat for RWSB: SW 01, SW 04, SW 08, SW 14, SW 18, SW 20, SW 24, SW 25, SW 27, SW 28, SW 30, SW 31 (southern portion), SW 32, SW 33, SW 34, SW 41, SW 42, SW 43, SW 48 (southern portion), and SW 49 (Table 5). Most of the seasonal wetlands in the northern two-thirds of the BSA are swale-like and generally lack inundation even following storm events (Table 5). No frog-fruit plants were observed in the BSA. Suitability of pools in the BSA may be further constrained by saline influence, high water table, and other

factors. RWSB could occur in the BSA, but the likelihood is low, especially in the northern portion of the BSA.

Vernal pool tadpole shrimp (*Lepidurus packardii*)

HABITAT AND BIOLOGY: Vernal pool tadpole shrimp is federally listed as endangered. They are known to inhabit a wide variety of vernal pool habitats. Their diet consists of organic debris and living organisms, such as fairy shrimp and other invertebrates (USFWS 2007b). This species has been collected in vernal pools ranging from 6.5 square feet to 88 acres in size. Some of these vernal pools may be too small to remain inundated for the entire life cycle, but the vernal pool tadpole shrimp may be able tolerate temporary drying conditions. Vernal pool tadpole shrimp have been found in pools with water temperatures ranging from 50 to 84° F. After winter rains fill their vernal pool habitats, dormant vernal pool tadpole shrimp cysts may hatch in as little as 4 days. Vernal pool tadpole shrimp generally take 3 to 4 weeks to mature. Additional cysts produced by adult tadpole shrimp during the wet season may hatch without going through a dormant period (USFWS 2005b).

RANGE: Vernal pool tadpole shrimp are known from Shasta County to Tulare County, California, from elevations between approximately 10 and 500 feet. (USFWS 2005a)

CRITICAL HABITAT: Critical habitat for vernal pool tadpole shrimp was designated in 2006 (71 FR 7118 7316). The BSA contains federal designated critical habitat for vernal pool tadpole shrimp. The critical habitat occurs throughout the entire BSA. The primary constituent elements (physical and biological features) essential for the species are: 1) Topographic features characterized by mounds and swales and depressions within a matrix of surrounding uplands that result in complexes of continuously, or intermittently, flowing surface water in the swales connecting the pools described below, providing for dispersal and promoting hydroperiods of adequate length in the pools; 2) Depressional features including isolated vernal pools with underlying restrictive soil layers that become inundated during winter rains and that continuously hold water for a minimum of 41 days, in all but the driest years; thereby providing adequate water for incubation, maturation, and reproduction. As these depressional features are inundated on a seasonal basis, they do not promote the development of obligate wetland vegetation habitats typical of permanently flooded emergent wetlands; 3) Sources of food, expected to be detritus occurring in the pools, contributed by overland flow from the pools' watershed, or the results of biological processes within the pools themselves, such as single-celled bacteria, algae, and dead organic matter, to provide for feeding; and 4) Structure within the pools described above, consisting of organic and inorganic materials, such as living and dead plants from plant species adapted to seasonally inundated environments, rocks, and other inorganic debris that may be washed, blown, or otherwise transported into the pools, that provide shelter.

KNOWN RECORDS: There are 26 CNDDDB records of vernal pool tadpole shrimp within the 9-quad area surrounding the BSA. The closest record (Occurrence #97) is approximately 0.9 mile south of the BSA near the Potrero Hills Landfill, around 0.25 miles south of Highway 12 at Scally Lane. Vernal pool tadpole shrimp were detected in ditches around the landfill

site in 2011. The drainage ditches were connected to large vernal pools to the east and vegetated with *Salicornia* sp. and *Typha* sp.

HABITAT PRESENT IN THE BSA: The deeper, more frequently inundated seasonal wetlands may provide suitable habitat for this species.

DISCUSSION: No potential vernal pool tadpole shrimp were observed during the general biological surveys in 2021. Within the BSA, only the deeper seasonal wetlands potentially inundate for duration sufficient for reproduction. Based on hydrology monitoring conducted in the winter and spring of 2021, and inundation depths assessed on November 4, 2021, 10 days after a large storm delivered over 6 inches of precipitation to the area on October 24, 2021, the following seasonal wetlands contain sufficient inundation to provide potential habitat for vernal pool fairy shrimp: SW 01, SW 04, SW 08, SW 14, SW 18, SW 20, SW 24, SW 25, SW 27, SW 28, SW 30, SW 31 (southern portion), SW 32, SW 33, SW 34, SW 41, SW 42, SW 43, SW 48 (southern portion), and SW 49 (Table 5). Most of the seasonal wetlands in the northern two-thirds of the BSA are swale-like and generally lack inundation even following storm events (Table 5). The physical and biological features identified as essential for the species in the critical habitat designation are absent or degraded in the northern two-thirds of the site.

2. Amphibians

California tiger salamander (*Ambystoma californiense*)

HABITAT AND BIOLOGY: California tiger salamander (CTS) is state listed as threatened. CTS primarily inhabits annual grasslands, open woodlands, and requires upland habitat that is occupied by small burrowing mammals such as California ground squirrel (*Otospermophilus beecheyi*) and Botta's pocket gopher (*Thomomys bottae*) in order to create underground burrow systems utilized by the salamanders throughout the year (USFWS 2017). Upland habitats surrounding known CTS breeding pools are usually dominated by grassland, oak savanna, or oak woodland (CNDDDB 2021). Although CTS is adapted to breeding in natural vernal pools and ponds, it now frequently uses livestock ponds and other modified ephemeral and permanent ponds. CTS larvae typically feed on invertebrate prey while adults prey on tadpoles, fish, and frogs (USFWS 2017a).

RANGE: The species is known from sites on the Central Valley floor near sea level, up to a maximum elevation of roughly 3,940 feet in the Coast Ranges and 1,640 feet in the Sierra Nevada foothills (Shaffer et al. 2013). CTS occurs in the following counties: Alameda, Amador, Calaveras, Contra Costa, Fresno, Kern, Kings, Madera, Mariposa, Merced, Monterey, Sacramento, San Benito, San Mateo, San Joaquin, San Luis Obispo, Santa Clara, Santa Cruz, Stanislaus, Solano, Tulare, Tuolumne, and Yolo (USFWS 2017a).

CRITICAL HABITAT: Critical habitat for California tiger salamander was designated in 2011 (76 FR 54346 54372). The BSA does not contain federal designated critical habitat for California tiger salamander. The nearest critical habitat occurs approximately 6.5 miles to the northeast.

KNOWN RECORDS: There are 39 CNDDDB records of CTS within the 9-quad area surrounding the BSA. The closest record (Occurrence #1195) is approximately 1.7 miles southeast of the BSA at the Potrero Hills Landfill, 1.3 miles south of Highway 12. The record is from an observation of 50 egg masses in a pond in 2017. The record is one of 6 total records clustered around the landfill, all within a 0.5-mile radius. The next nearest record (Occurrence #1181) is approximately 2.5 miles east of the BSA about 1.1 miles northeast of Highway 12 at Nurse Slough Road. Two juveniles were observed in vernal pools and swales surrounded by grasslands in 2010.

Dr. Jaymee Marty conducted CTS studies within Travis Air Force Base (AFB) and documented breeding ponds there. Dr. Marty also conducted trapping studies since 2017 revealing breeding ponds adjacent to the immediate south of the AFB property (pers. com., Jaymee Marty, 29 June 2021). Several adults were found in pit fall traps adjacent to a large scrape/pool located along Branscombe Road, approximately 1.3 miles east of the BSA.

HABITAT PRESENT IN THE BSA: The southernmost seasonal wetland between drainage ditches DD-01 and DD-02 provides potentially suitable breeding habitat for CTS. Uplands and other wetlands located within 1.24 miles of potentially suitable breeding habitat may be used for dispersal.

DISCUSSION: No potential CTS individuals of any life stage were observed during the general biological surveys in 2021. Within the BSA, only the southernmost portion of SW 31 provides potentially suitable breeding habitat for CTS. The southernmost portion of SW 31 contains a roughly 0.7-acre pool (located roughly 250 feet northeast of SR 12) that remained inundated through at least February and March of spring 2021 (a dry year) and contained over 16 inches of inundation during the depth assessment on November 4, 2021. This pool typically remains inundated through spring based on inundation visible in historic aerial photos available in Google Earth. Based on hydrology monitoring and aerial photograph review conducted as part of the wetland delineation (SWCA 2021), other aquatic features present within the BSA do not inundate for sufficient durations to provide suitable breeding habitat, even in wet years. The coastal brackish marsh contains fish and CTS are not known to occur in coastal brackish marsh.

Potential refuge burrows for CTS are present in the BSA at low abundance. No California ground squirrels or burrows large enough to support California ground squirrels were observed in the BSA. A few patches of fossorial rodent mounds (likely those of Botta's pocket gopher; *Thomomys bottae*) were observed scattered throughout the BSA.

The CTS site assessment guidelines recommend evaluating potential breeding habitat within 1.24 miles of the site (USFWS & CDFW 2003). Outside of the BSA, the nearest potentially suitable breeding habitat within 1.24 miles consists of 1) a seasonally inundated detention basin located 0.24 mile northeast of the BSA, adjacent and north of Petersen Road, adjacent to athletic fields; and, 2) a seasonally inundated pool located approximately 0.26 mile east of the brackish marsh at the southern tip of the BSA. Based on historic aerial photographs, both aquatic features remain inundated through May or June in at least some years. There are no

known records of CTS in these features but known recent records do occur within dispersal distance (populations documented by Jaymee Marty south of the AFB).

All portions of the BSA are located within dispersal distance (1.24 miles) of potential CTS breeding habitat. Habitat in the BSA is marginal due to ongoing disking and dryland farming and potential salinity tolerance limits (especially in the southern portion of the BSA). CTS are potentially present within the BSA, but the likelihood of occurrence is low.

3. Reptiles

Western pond turtle (*Emys marmorata*)

HABITAT AND BIOLOGY: Western pond turtle (WPT) is a CDFW species of special concern. WPT prefer aquatic habitats with abundant vegetative cover and exposed basking sites such as logs. WPT are associated with permanent or nearly permanent water in a wide variety of habitat types, normally in ponds, lakes, streams, irrigation ditches, or permanent pools along intermittent streams (CWHR 2021). They are omnivorous generalists and opportunistic predators that prey upon small insects, aquatic invertebrates, fish, frogs, snakes, and small mammals. They also eat aquatic plant material and carrion (Stebbins 2003).

Two distinct habitats may be used for oviposition. Along large, slow-moving streams, eggs are deposited in nests constructed in sandy banks. Along foothill streams, females may climb hillsides, sometimes traveling over 330 feet to find a suitable nest site. Soil must usually be at least 4 inches deep for nesting. Generally, 3 to 11 eggs are laid from March to August depending on local conditions and are incubated for approximately 73 to 80 days (CWHR 2021).

RANGE: WPT occur throughout northern California west of the Sierra Nevada (Stebbins 2003) from sea level to 6,000 feet (CWHR 2021).

KNOWN RECORDS: There are 14 CNDDDB records of WPT within the 9-quad area surrounding the BSA. The closest record (Occurrence #780) is approximately 3.5 miles northeast of the BSA, northwest of the intersection of Diablo Road and Valley View Way near Travis Air Force Base. In 2008, 1 turtle was observed in a seasonal pond surrounded by scattered willows (*Salix* sp.) and cottonwoods (*Populus* sp.).

HABITAT PRESENT IN THE BSA: Drainage Ditch DD-01 and the coastal brackish marsh provide potentially suitable habitat for WPT.

DISCUSSION: No potential WPT individuals of any life stage were observed during the general biological surveys. WPT could occur in DD-01 and the coastal brackish marsh. Habitat in these two features is marginal due to shallow water depth (estimated to be around 1-12 inches; potentially up to 24 inches in a few spots), and due to the high density of freshwater and brackish marsh vegetation, which would make it difficult for a turtle to move through or forage in these features. No WPT nesting would be expected in the BSA due to a lack of sufficient suitable aquatic habitat, and the hard silty-clayey soils that occur throughout the BSA.

4. Birds

Tricolored blackbird (*Agelaius tricolor*)

HABITAT AND BIOLOGY: Tricolored blackbird is a state threatened species. Tricolored blackbirds form the largest breeding colonies of any North American inland bird species (Shuford and Gardali 2008). Colonies vary in size from a minimum of about 50 nests to over 20,000 in an area of 10 acres or less (CWHR 2021). Nesting colonies are of concern to CDFW (2021b).

Basic breeding site requirements are open, accessible water; a protected nesting substrate, including either flooded, thorny, or spiny vegetation; and a suitable foraging space providing adequate insect prey within a few kilometers of the nesting colony. Since the 1970s, an increasing percentage of colonies have been reported in Himalayan blackberry and thistles, with some of the largest colonies in silage and grain fields near dairies in the San Joaquin Valley. Other less commonly used nesting vegetation include safflower, tamarisk, elderberry, western poison oak, giant reed, riparian scrublands, and riparian forests (Shuford and Gardali 2008).

Ideal foraging conditions for this species are created when shallow flood irrigation, mowing, or grazing keeps the vegetation less than 6 inches tall. Preferred foraging habitats include crops such as rice, alfalfa, irrigated pastures, and ripening or cut grain fields, as well as annual grasslands, cattle feedlots, and dairies. Tricolored blackbirds also forage in native habitats, including wet and dry vernal pools and other seasonal wetlands, riparian scrub habitats, and open marsh borders. Proximity to suitable foraging habitat appears important for the establishment of colony sites (Shuford and Gardali 2008).

RANGE: In California, tricolored blackbird breeds in the Sacramento and San Joaquin valleys, the foothills of the Sierra Nevada south to Kern County, the coastal slope from Sonoma County south to the Mexican border, and sporadically on the Modoc Plateau. Individuals usually move north after first nesting efforts (March-April) in the San Joaquin Valley and Sacramento County to new breeding locations in the Sacramento Valley, northeastern California, and rarely Oregon, Nevada, and Washington (Shuford and Gardali 2008).

KNOWN RECORDS: There are 12 CNDDDB records of tricolored blackbird within the 9-quad area surrounding the BSA. The closest record (Occurrence #837) is approximately 1.4 miles south of the BSA 0.3 mile southwest of Potrero Hills Landfill and Emmington Road intersection. Approximately 1,000 birds were observed on a hillside above Landfill Access Road in dense thistle and mustard patches in 2011. The birds were foraging in the Hill Slough area and over onto the landfill. Surrounding vegetation included cattails, mustard and thistle.

HABITAT PRESENT IN THE BSA: Drainage ditch DD-01 and the coastal brackish marsh provide potentially suitable habitat for nesting for tricolored blackbird. Tricolored blackbird could forage in the uplands and seasonal wetlands.

DISCUSSION: No tricolored blackbird or potential tricolored blackbird nests were observed during the general biological surveys. Tricolored blackbird could nest in DD-01 and the coastal brackish marsh. These aquatic habitats contain dense patches of bulrush (*Schoenoplectus* sp.) and cattail (*Typha* sp.) vegetation. Habitat in these two features is marginal due to the limited extent and/or width of marsh vegetation, which may not provide adequate refuge and concealment for a nesting colony. DD-01 is bordered on both sides by tall chain link fence. The coastal brackish marsh is located immediately adjacent to SR 12. The valley floor grassland, alkali meadow, and seasonal wetland provide suitable foraging habitat for tricolored blackbird. There are no known nesting colonies in or near the BSA.

Grasshopper sparrow (*Ammodramus savannarum*)

HABITAT AND BIOLOGY: Grasshopper sparrow is a CDFW species of special concern. Nesting habitat is of concern to CDFW (2020). Grasshopper sparrow occur in California primarily as a summer resident from March to September (Shuford and Gardali 2008). This species generally prefers short to middle-height, moderately open grasslands with scattered shrubs, and in some cases prefers native bunchgrasses. These sparrows are generally absent from areas with extensive shrub cover, though some shrubbery is tolerated and perhaps preferred. Patchy bare ground has also been noted as an important habitat component elsewhere. Grasshopper sparrows are more likely to be found in large tracts of habitat than in small ones (Shuford and Gardali 2008).

Grasshopper sparrows breed from early April to mid-July, with a peak in May and June. A thick cover of grasses and forbs is essential for concealment. Pairs generally nest solitarily and build a nest of grasses and forbs in a slight depression in the ground, hidden at the base of an overhanging clump of grasses or forbs. They search for food on the ground and in low foliage within relatively dense grasslands (CWHR 2021).

RANGE: In California, grasshopper sparrow is an uncommon and local, summer resident and breeder in foothills and lowlands west of the Cascade-Sierra Nevada crest from Mendocino and Trinity counties south to San Diego County (CWHR 2021). They breed very locally, primarily at the edges and in low foothills, but also very sparingly on the valley floor (Shuford and Gardali 2008).

KNOWN RECORDS: There is 1 CNDDDB record of grasshopper sparrow within the 9-quad area surrounding the BSA. The record (Occurrence #27) is approximately 7.5 miles northeast of the BSA, east of Box Ranch Road. A total of 3 males were detected in grassland and seasonal wetlands surrounded by agricultural lands in 2017.

HABITAT PRESENT IN THE BSA: The valley floor grassland and alkali meadow provide potential nesting habitat for grasshopper sparrow. The valley floor grassland, alkali meadow, and seasonal wetland provide suitable foraging habitat.

DISCUSSION: No grasshopper sparrows or potential grasshopper sparrow nests were observed during the general biological surveys. Grasshopper sparrow could nest in the BSA. However, seasonal disking and harvesting in the farmed area may preclude nesting in that portion of the property.

Golden eagle (*Aquila chrysaetos*)

HABITAT AND BIOLOGY: Golden eagles are generally found in open country of prairies, arctic and alpine tundra, open wooded country, and barren areas, especially in hilly or mountainous regions (Natureserve 2021). Golden eagles need open terrain for hunting such as grasslands, deserts, savannahs, and early successional stages of forest and shrub habitats. Golden eagles use secluded cliffs with overhanging ledges and large trees for cover. Golden eagles nest on cliffs of all heights and in large trees in rugged, open areas with canyons and escarpments. Alternative nest sites are maintained, and old nests are reused. Golden eagles breed from late January through August with a peak from March through July (CWHR 2021). Nesting and nonbreeding/wintering sites are of concern to CDFW (2021b).

RANGE: Golden eagles are an uncommon permanent resident and migrant throughout California, except the center of the Central Valley. This species is perhaps more common in southern California than in the north. Golden eagles range from sea level to 11,500 ft (CWHR 2021).

KNOWN RECORDS: There is 1 CNDDDB record of golden eagle within the 9-quad area surrounding the BSA. The record (Occurrence #142) is from 2015, approximately 9 miles southwest of the BSA, along the hills south of Cordelia. The record is for golden eagles that were observed taking a rabbit.

HABITAT PRESENT IN THE BSA: No potential nesting habitat occurs in the BSA or nearby. The valley floor grassland, alkali meadow, coastal brackish marsh, freshwater marsh, and seasonal wetland provide suitable foraging habitat.

DISCUSSION: No golden eagles or potential raptor nests were observed during the general biological surveys. The entire BSA provides potential foraging habitat. Golden eagles may sometimes forage in the BSA.

Short-eared owl (*Asio flammenus*)

HABITAT AND BIOLOGY: Short-eared owl is a CDFW species of special concern. Nesting sites are of concern to CDFW (2021). Short-eared owl requires areas with dense vegetation. Tall grasses, brush, ditches, and wetlands are used for resting and roosting cover (CWHR 2021). Habitat components for short-eared owl generally include large areas with low vegetation, dry upland areas for nesting, and sufficient suitable prey base. Approximately 99% of the diet of short-eared owl is composed of small mammals (Shuford and Gardali 2008). Short-eared owl nests on dry ground in a depression concealed in vegetation, and lined with grasses, forbs, sticks, and feathers; occasionally nests in a burrow (CWHR 2021). Nearby water may be a requirement for nesting habitat (Natureserve 2021). The breeding season occurs from March through July (Shuford and Gardali 2008).

RANGE: Small resident populations occur in the Great Basin region and locally in the Sacramento-San Joaquin river delta. This species occasionally breeds along coastal central California and in the San Joaquin Valley (Shuford and Gardali 2008).

In Solano County, the Grizzly Island Wildlife Area in the Suisun Marsh supports the only resident population of short-eared owls in this region. Management to provide habitat and prey annually has resulted in a few resident owls at Grizzly Island ever since, and large numbers in some years (Shuford and Gardali 2008).

KNOWN RECORDS: There is 1 CNDDDB record of short-eared owl within the 9-quad area surrounding the BSA. The record (Occurrence #12) is approximately 3.7 miles south of the BSA in Grizzly Island Wildlife Area. The occurrence was recorded in 1987 where the observed owls were found in coastal marsh and flat grassland habitat.

HABITAT PRESENT IN THE BSA: The valley floor grassland and alkali meadow provide potential nesting habitat for short-eared owl. The valley floor grassland, alkali meadow, coastal brackish marsh, and seasonal wetland provide suitable foraging habitat.

DISCUSSION: No short-eared owls or potential short-eared owl nests were observed during the general biological surveys. Short-eared owls could nest in the BSA. However, seasonal disking and harvesting in the farmed area may preclude nesting in that portion of the property. Vegetation in the grassland, meadow, and wetland communities is typically no more than 6-12 inches tall and thus may not provide adequate nest concealment. The BSA is located about 2 miles west of the nesting range for this species (CWHR 2021). The potential for nesting in the BSA is low.

Burrowing owl (*Athene cunicularia*)

HABITAT AND BIOLOGY: Burrowing owl is a CDFW species of special concern. Nesting sites are of concern to CDFW (2020). Burrowing owls primarily inhabit open, dry grassland and desert habitats, such as grasses, forbs, and open shrub stages of pinyon-juniper and ponderosa pine habitats (CWHR 2021, Shuford and Gardali 2008). Main habitat components include burrows for roosting and nesting, and relatively short vegetation with sparse shrubs and taller vegetation (Shuford and Gardali 2008). Burrowing owls most commonly use ground squirrel burrows, but they may also use badger, coyote, and fox holes or dens; or human-made structures such as culverts, piles of concrete rubble, pipes and nest boxes (CWHR 2021; Shuford and Gardali 2008). An active nest chamber is often lined with excrement, pellets, debris, grass and feathers (CWHR 2021). This species also thrives in highly altered human landscapes. In agricultural areas, owls nest along roadsides, under water conveyance structures, and near and under runways and similar structures. In urban areas, burrowing owls persist in low numbers in highly developed parcels, busy urban parks, and adjacent to roads with heavy traffic. In the Imperial Valley, owls are able to excavate their own burrows in soft earthen banks of ditches and canals (Shuford and Gardali 2008).

Burrowing owls are a semi-colonial species that breed in California from March through August, though breeding can begin as early as February and extend into December (Shuford and Gardali 2008; CWHR 2021). A large proportion of adults show strong nest site fidelity. Burrowing owls typically feed on a broad range of insects, but also on small rodents, birds, amphibians, reptiles, and carrion. Foraging usually occurs close to their burrow (Shuford and Gardali 2008).

RANGE: Burrowing owls are a year-round resident in most of California, particularly in the Central Valley, San Francisco Bay region, Carrizo Plain, and Imperial Valley (Shuford and Gardali 2008).

KNOWN RECORDS: There are 42 CNDDDB records of burrowing owl within the 9-quad area surrounding the BSA. The closest record (Occurrence #1) is from 1992, approximately 1 mile south of the BSA on the west side of Potrero Hills Lane. A single bird was observed in a rubble pile composed of concrete blocks in disked annual grassland habitat.

HABITAT PRESENT IN THE BSA: When burrows are present, the valley floor grassland and alkali meadow may provide suitable nesting habitat for burrowing owl. The valley floor grassland, alkali meadow, coastal brackish marsh, freshwater marsh, and seasonal wetland provide suitable foraging habitat.

DISCUSSION: No burrowing owls, or sign of burrowing owl were observed during general biological surveys, which included walking transects through the BSA spaced approximately 50 feet apart while searching for potentially suitable burrows. No California ground squirrels or burrows potentially suitable for burrowing owl were observed in or adjacent to the BSA. Especially in the southern portion of the BSA, a seasonally elevated water table may limit suitability for nesting and overwintering. Should any burrows become established in the northern portion of the BSA, including areas within the Petersen Road and SR 12 right-of-way, burrowing owl could occupy the burrows. The entire BSA provides potential foraging habitat.

Swainson's hawk (*Buteo swainsoni*)

HABITAT AND BIOLOGY: Swainson's hawk is a state threatened species. Nesting sites are of concern to CDFW (2021b). Swainson's hawks nest in open riparian habitat, in scattered trees, or in small groves in sparsely vegetated flatlands. Nesting areas are usually located near water, but are occasionally found in arid regions. Typical habitat includes open desert, grassland, or cropland containing scattered, large trees or small groves (CWHR 2021). Swainson's hawk breeds from late March to late October (CWHR 2021). They forage in adjacent grasslands, suitable grain or alfalfa fields, or in livestock pastures, feeding on rodents, small mammals, small birds, reptiles, large arthropods, amphibians, and, rarely, fish (Bloom 1980; CWHR 2021).

RANGE: Swainson's hawk is an uncommon breeding resident and migrant in the Central Valley, Klamath Basin, Northeastern Plateau, Lassen County, and Mojave Desert. Swainson's hawks breed and forage in the California's Central Valley in spring and summer. Migrating individuals move south through the southern and central interior of California in September and October, some migrating as far as South America (CWHR 2021).

KNOWN RECORDS: There are 56 CNDDDB records of Swainson's hawk within the 9-quad area surrounding the BSA. The closest record (Occurrence #2714) is from 2015, approximately 3.4 miles northeast of the BSA, north of Cement Hill Road. An adult and a

juvenile bird were observed near a nest in a eucalyptus tree surrounded by residential development and commercial properties.

HABITAT PRESENT IN THE BSA: No potential nest trees occur in the BSA. The valley floor grassland, alkali meadow, coastal brackish marsh, freshwater marsh, and seasonal wetland provide suitable foraging habitat.

DISCUSSION: No Swainson's hawks or potential raptor nests were observed during the general biological surveys. A few young/small riparian trees occur along the drainage ditches DD-01 and DD-02. The trees are not large enough to support the nest of a large raptor such as Swainson's hawk. Potentially suitable nest trees occur off-site approximately 150 feet southwest of the BSA on the south side of SR 12, approximately 120 feet west of the BSA on the west side of west side of Walters Road, and approximately 80 feet north of the BSA on the north side of Petersen Road. Swainson's hawk could nest in these trees located nearby. The entire BSA provides potential foraging habitat. According to the CNDDDB there are no known Swainson's hawk nests within at least 3 miles of the BSA.

Northern harrier (*Circus cyaneus*)

HABITAT AND BIOLOGY: Northern harrier is a CDFW species of special concern. Nesting sites are of concern to CDFW (2021). Northern harriers breed and forage in a variety of open habitats that provide adequate vegetative cover, an abundance of suitable prey, and scattered hunting, plucking, and lookout perches such as shrubs and fence posts. In California, such habitats include freshwater marshes, brackish and saltwater marshes, wet meadows, weedy borders of lakes, rivers and streams, annual and perennial grasslands, vernal pool complexes, weed fields, ungrazed or lightly grazed pastures, low-growing crop fields, sagebrush flats, and desert sinks (Shuford and Gardali 2008). Northern harriers feed mostly on voles and other small mammals, birds, frogs, small reptiles, crustaceans, insects, and rarely on fish (CWHR 2020).

Northern harriers nest on the ground, mostly at marsh edge of emergent wetlands or along rivers or lakes (CWHR 2020), and generally within patches of dense vegetation in undisturbed areas (Shuford and Gardali 2008). They may also nest in grasslands, grain fields, or on sagebrush flats several miles from water. Nests are built of large mounds of sticks on wet areas, and a smaller cup of grasses on dry sites. Breeding occurs from April to September, with peak activity occurring June through July. Single clutches are produced annually. The nestling period lasts about 53 days (CWHR 2021).

RANGE: Northern harriers occur from annual grassland up to lodgepole pine and alpine meadow habitats. Northern harriers breed from sea level to 5,700 feet in the Central Valley and southern Sierra Nevada. Northern harriers are a permanent resident of the northeastern Modoc plateau and coastal areas and a less common resident of the Central Valley (Shuford and Gardali 2008, CWHR 2021).

KNOWN RECORDS: There is 1 CNDDDB record of northern harrier within the 9-quad area surrounding the BSA. The record (Occurrence #31) is from 2004, and is located approximately 3.6 miles southwest of the BSA, 3 miles southeast of Fairfield. A pair was

observed nesting in coastal brackish marsh, dominated by *Salicornia virginica*, *Scirpus* spp. and *Typha* spp.

HABITAT PRESENT IN THE BSA: The valley floor grassland, alkali meadow, and coastal brackish marsh provide potential nesting habitat for northern harrier. The valley floor grassland, alkali meadow, coastal brackish marsh, freshwater marsh, and seasonal wetland provide suitable foraging habitat.

DISCUSSION: One adult northern harrier was observed foraging over the grassland, alkali meadow, and seasonal wetlands in the BSA on March 8, 2021. No potential raptor nests were observed during the general biological surveys. Northern harrier could nest in the BSA. However, seasonal disking and harvesting in the farmed area may preclude nesting in that portion of the property. The entire BSA provides potential foraging habitat.

Mountain plover (*Charadrius montanus*)

HABITAT AND BIOLOGY: Forages in short grasslands and plowed fields, searching ground for large insects, especially grasshoppers (CWHR 2021). This species is not known to nest in California (CWHR 2021). The mountain plover winters in agricultural habitats with short grasses and semidesert habitats, similar to their nesting habitats in the intermountain west.

RANGE: Winters from southern Texas through Mexico and southern Arizona and into California, below 3,200 feet. Occurs in the Central Valley from Sutter and Yuba counties southward (CWHR 2021). Also found in foothill valleys west of San Joaquin valley, and in the Imperial valley. Winter resident from September through March.

KNOWN RECORDS: There are 4 CNDDDB records of mountain plover within the 9-quad area surrounding the BSA. The closest record (Occurrence #1) is from 1992, approximately 7.9 miles east of the BSA, near Creed Road. About 36 birds were observed overwintering north and south of Creed Road in valley and foothill grassland. More recent sightings from 2007 included 200+ individuals observed in the valley and foothill grasslands, approximately 13 miles to the east.

HABITAT PRESENT IN THE BSA: The valley floor grassland, alkali meadow, coastal brackish marsh, freshwater marsh, and seasonal wetland provide suitable foraging and wintering habitat for this species.

DISCUSSION: No mountain plovers were observed during the general biological surveys. Mountain plovers feed primarily on insects, and rarely seeds. Wintering birds are known to gather in tilled or burned farm fields, harvested alfalfa, alkaline flats, and coastal prairies. The entire BSA provides potential foraging/overwintering habitat for this species. Wintering mountain plover could occur in the BSA from approximately September through March.

Yellow rail (*Coturnicops noveboracensis*)

HABITAT AND BIOLOGY: Yellow rail is a CDFW species of special concern. This species prefers densely vegetated sedge marshes and meadows with moist soils or shallow waters. Yellow rails typically raise one brood per year, however their exact nesting periods in

California are unknown. They build low (approx. 5 cm above ground level) nests out of woven sedges / rushes. Yellow rails forage for food by picking at the ground and consume small snails, seeds, earthworms, insects, and other invertebrates (Shuford and Gardali 2008).

RANGE: In California, there is little information on the yellow rail's historic range, but it is known to occur year-round in California. The species is a local breeder in the northeastern interior portions of the state. Overwintering populations are known to inhabit coastal regions such as the San Francisco Bay estuary and the Suisun Marsh region from October to April. Yellow rails were documented at Tomales Bay and Grizzly Island in 2002. Breeding populations have also been documented in the Bridgeport Valley. Rarely sighted in the Central Valley region (Shuford and Gardali 2008).

KNOWN RECORDS: There are 4 CNDDDB records of yellow rails within the 9-quad area surrounding the BSA. The closest record (Occurrence #40) is approximately 3.2 miles southwest of the Project area. Three individuals were caught and released at this location in March and October of 2009.

HABITAT PRESENT IN THE BSA: The coastal brackish marsh provides suitable foraging habitat for yellow rail.

DISCUSSION: No yellow rails or potential yellow rail nests were observed during the general biological surveys. This species could be present in the coastal brackish marsh at the southeast corner of the BSA as a winter visitor from approximately early October to mid-April. No breeding would be expected in the BSA. Yellow rail would not be expected to occur in the drainage ditches that traverse the BSA as these drainage features are not of sufficient width to provide suitable habitat.

White-tailed kite (*Elanus leucurus*)

HABITAT AND BIOLOGY: White-tailed kites are a state fully protected species. White-tailed kites occur in herbaceous and open stages of most habitats in cismontane California. They are rarely found away from agricultural areas. They forage in undisturbed, open grasslands, meadows, farmlands, and emergent wetlands. White-tailed kite prey mostly on voles and other small, diurnal mammals, occasionally on birds, insects, reptiles, and amphibians (CWHR 2021).

White-tailed kites breed from February to October, with peak activity occurring from May to August. They are typically single-brooded, but occasionally have two broods. Substantial groves of dense, broad-leafed deciduous trees are used for nesting and roosting. In southern California, they also roost in saltgrass and Bermuda grass. Nests are made of loosely piled sticks and twigs and lined with grass, straw, or rootlets. Nests are typically located near the top of dense oak, willow, or other tree stands from 20 to 100 feet above the ground, and are often located near an open foraging area (CWHR 2021).

RANGE: White-tailed kites are a common to uncommon yearlong resident of coastal and valley lowlands in cismontane California. They are absent from higher elevations in the Sierra Nevada, the Modoc Plateau, and from most desert regions (CWHR 2021).

KNOWN RECORDS: There are 2 CNDDDB records of white-tailed kite within the 9-quad area surrounding the BSA. The closest record (Occurrence #97) is from 2004, approximately 7.3 miles west of the BSA, just east of Suisun Creek, about 0.5 mile south of I-80. Two adult and two juvenile birds were observed near a nest in a live oak tree adjacent to railroad tracks.

HABITAT PRESENT IN THE BSA: No potential nest trees occur in the BSA. The valley floor grassland, alkali meadow, coastal brackish marsh, freshwater marsh, and seasonal wetland provide suitable foraging habitat.

DISCUSSION: No white-tailed kites or potential raptor nests were observed during the general biological surveys. A few young/small riparian trees occur along the drainage ditches DD-01 and DD-02. The trees are not large enough or dense enough at the top to support the nest of a white-tailed kite. Potentially suitable nest trees with more dense canopies occur off-site approximately 150 feet southwest of the BSA on the south side of SR 12, approximately 120 feet west of the BSA on the west side of west side of Walters Road, and approximately 80 feet north of the BSA on the north side of Petersen Road. White-tailed kite could nest in these trees located nearby. The entire BSA provides potential foraging habitat.

Loggerhead shrike (*Lanius ludovicianus*)

HABITAT AND BIOLOGY: Loggerhead shrike is a CDFW species of special concern. Nest sites are of concern to CDFW (2021b). In California, loggerhead shrike breeds mainly in shrublands or open woodlands. They require tall shrubs, trees, fences or power lines for hunting perches, territorial advertisement, and pair maintenance; open areas of short grasses, forbs, or bared ground for hunting; and large shrubs or trees for nesting. This species also needs impaling sites for prey manipulation or storage. Impaling sites can include sharp, thorny, or multi-stemmed plants or barbed-wire fences. Their diet varies seasonally, but generally includes assorted insects, reptiles, amphibians, small rodents, and birds (Shuford and Gardali 2008). Loggerhead shrikes build their nest on a stable branch in densely foliated shrubs or trees. In California, eggs are laid from March into May, with young becoming independent in July or August (CWHR 2021).

RANGE: Loggerhead shrikes occur throughout the State except for the forested coastal slope, forested coastal mountains, the Klamath and Siskiyou mountains of northwestern California, the Sierra Nevada and southern Cascades, and high elevations of the Transverse Ranges. They are present year-round throughout most of this range (Shuford and Gardali 2008).

KNOWN RECORDS: There are no CNDDDB records of this species in the 9-quad area centered on the BSA. The closest CNDDDB record (Occurrence #3) is approximately 22.7 miles southeast of the BSA. The record consists of 4 adults observed at a nest site in an ornamental tree near an abandoned house in March 2003. There are numerous reports of loggerhead shrike sightings in the vicinity of the Project area recorded in eBird (2021). One recorded eBird sighting from May 2021 is located only 1.5 miles east of the Project area.

HABITAT PRESENT IN THE BSA: The few riparian trees that occur along DD-01 and DD-02 provide potential nesting habitat for loggerhead shrike. The valley floor grassland, alkali meadow, coastal brackish marsh, freshwater marsh, and seasonal wetland provide suitable foraging habitat.

DISCUSSION: One adult loggerhead shrike was observed perched on the chain-link fence bordering DD-01 on July 20, 2021. No potential loggerhead shrike nests were observed during the general biological surveys. Loggerhead shrike could nest in the few riparian trees in the BSA. The entire BSA provides potential foraging habitat.

California black rail (*Laterallus jamaicensis coturniculus*)

HABITAT AND BIOLOGY: California black rail is listed as state threatened and depends on emergent wetland habitats for all stages of its life cycle. It is the smallest rail in North America and has a patchy and poorly understood distribution. It is found in saltwater, brackish and freshwater marshes dominated by a variety of vegetation types and dense cover (Richmond et al. 2010).

RANGE: California black rail occurs along the Pacific coast from Bodega Bay to north-west Baja California, in the San Francisco Bay-Delta Estuary (where it is most abundant), inland in small numbers in the Salton Trough and along the lower Colorado River, and in the northern Sierra foothills of Butte, Nevada, Placer and Yuba counties (Richmond et al. 2010).

KNOWN RECORDS: There are 37 CNDDDB record of California black rail within the 9-quadrant area surrounding the BSA. The closest record (Occurrence #118) is from 2009, approximately 0.67 mile southwest of the BSA at the east end of Hill Slough Wildlife Area. An unknown number of individuals were detected in 2009 in a lower high intertidal zone of brackish marsh, vegetated with *Cuscuta salina*, *Distichlis spicata*, *Salicornia virginica*, *Jaumea carnosa*, *Limonium californicum*, *Atriplex triangularis*, and *Plantago subnuda*.

HABITAT PRESENT IN THE BSA: The coastal brackish marsh provides suitable foraging habitat for California black rail.

DISCUSSION: No California black rails or potential rail nests were observed during the general biological surveys. This species could be present in the coastal brackish marsh at the southeast corner of the BSA as a winter visitor from approximately early October to mid-April. No breeding would be expected in the BSA. California black rail would not be expected to occur in the drainage ditches that traverse the BSA as these drainage features are not of sufficient width to provide suitable habitat.

Suisun song sparrow (*Melospiza melodia maxillaris*)

HABITAT AND BIOLOGY: Suisun song sparrow is a CDFW species of special concern that is associated primarily with tidal channels, especially in marshes where pickleweed (*Salicornia* sp.) dominates and gumplint (*Grindelia* sp.) lines the channels. The year-round diet of the song sparrow in California is roughly 79% vegetable and 21% animal matter. As with all song sparrow subspecies, dense vegetation is required for nesting sites, song perches and

cover for refuge from predators while exposed ground for foraging is also a requirement (Shuford and Gardali 2008).

RANGE: Suisun song sparrow is confined to tidal salt and brackish marshes fringing the Carquinez Strait and Suisun Bay east to Antioch, at the confluence of the San Joaquin and Sacramento rivers.

KNOWN RECORDS: There are 33 CNDDDB records of Suisun song sparrow within the 9-quad area surrounding the BSA. The closest record (Occurrence #25) is from 2009, approximately 2.2 miles west of the BSA, north of Duck Slough. Approximately 2 to 4 Suisun song sparrows were detected in 2004 in brackish marsh with vegetation consisting of *Salicornia virginica*, *Scirpus* sp., and *Typha* sp.

HABITAT PRESENT IN THE BSA: Vegetation in and along drainage ditch DD-01 and the coastal brackish marsh may provide suitable nesting habitat for Suisun song sparrow. The valley floor grassland, alkali meadow, coastal brackish marsh, freshwater marsh, and seasonal wetland provide suitable foraging habitat.

DISCUSSION: No Suisun song sparrows or potential song sparrow nests were observed in the BSA during the general biological surveys. Suisun song sparrow could nest along drainage ditch DD-01 and in the coastal brackish marsh. The entire BSA provides potential foraging habitat.

Yellow-headed blackbird (*Xanthocephalus xanthocephalus*)

HABITAT AND BIOLOGY: Yellow-headed blackbird is a California species of special concern. Breeding populations are found in regions with large and productive marshes. Yellow-headed blackbirds breed, nest, and forage almost exclusively in marshes and wetlands with relatively deep water, and tall emergent vegetation, such as rushes and cattails. Nests are constructed from dry vegetation and placed in dense cover on the edges of water bodies such as lakes, reservoirs, or larger ponds. The nests are often attached to cattails about 30 cm above the water's surface. Their overall yearly diet consists of a combination of seeds and insects. During breeding season, the adults forage primarily on insects and feed their young a diet of almost exclusively damselflies and other aquatic insects. Preferred habitat contains ample open water, moderately dense vegetation and extensive channels, characteristics suited for adequate support for nests and safety from predators (Shuford and Gardali, 2008).

RANGE: Scattered, local populations occur in the Mojave Desert, the Imperial and Coachella Valleys, the Klamath Basin, Mono Basin, Modoc Plateau, Great Basin Desert, the Sierra Valley, and mountain valleys in northeastern California. However, due to the 90% loss of historic wetlands in the Central Valley, population records indicate that few breeding adults find suitable habitat in this region outside of wildlife refuges. In the San Joaquin Valley, the species is fairly numerous locally, with the best pockets of suitable habitat along rivers (especially on the west side), throughout the wetland complex of the Grasslands Ecological Area near Los Banos (Shuford and Gardali, 2008).

KNOWN RECORDS: There are no CNDDDB records of yellow-headed blackbird within the 9-quad area surrounding the BSA. The closest CNDDDB record (Occurrence #7) is from 1899, approximately 23 miles southwest of the BSA near Pinole, CA. The exact location and number of birds are unknown.

HABITAT PRESENT IN THE BSA: Drainage ditch DD-01 and the coastal brackish marsh provide potentially suitable habitat for nesting for yellow-headed blackbird. Yellow-headed blackbird could forage in the uplands and seasonal wetlands.

DISCUSSION: No yellow-headed blackbird or potential yellow-headed blackbird nests were observed during the general biological surveys. Yellow-headed blackbird could nest in DD-01 and the coastal brackish marsh. These aquatic habitats contain dense patches of bulrush and cattail vegetation. Habitat in these two features is marginal due to the limited extent and/or width of marsh vegetation, which may not provide adequate refuge and concealment for a nesting colony. DD-01 is bordered on both sides by tall chain link fence. The coastal brackish marsh is located immediately adjacent to SR 12. The valley floor grassland, alkali meadow, and seasonal wetland provide suitable foraging habitat for yellow-headed blackbird. There are no known nesting colonies in or near the BSA.

Nesting Birds Listed Under the MBTA or Regulated by CA Fish and Game Code

The federal Migratory Bird Treaty Act (MBTA) of 1918 (16 U.S.C. 703-711) protects most birds and their nests, including most non-migratory birds in California. The MBTA makes it unlawful to take, possess, buy, sell, purchase, or barter any bird listed in 50 CFR Part 10 including feathers or other parts, nests, eggs, or products, except as allowed by implementing regulations. Any disturbance that causes direct injury, death, nest abandonment, or forced fledging of migratory birds, is restricted under the MBTA. Any removal of active nests during the breeding season or any disturbance that results in the abandonment of nestlings is considered a 'take' of the species under federal law. California Fish and Game Code (FGC) § 3503 protects most birds and their nests. FGC § 3503.5 further protects all birds in the orders Falconiformes and Strigiformes (collectively known as birds of prey). Birds of prey include raptors, falcons, and owls.

HABITAT PRESENT IN THE BSA: The BSA provides potential nesting habitat for birds listed under the MBTA and/or regulated by FGC. Depending on the species, birds may nest on trees, shrubs, in or on the ground, and on artificial structures such as buildings, poles, and signs.

DISCUSSION: Numerous birds protected pursuant to the MBTA or regulated by CA Fish and Game Code were observed foraging during the surveys (Appendix C). No potential active bird nests were observed in the BSA. Nesting or attempted nesting by migratory birds and birds-of-prey is anticipated from February 1st to September 30th. Construction during the nest season could lead to active nest destruction or abandonment.

5. Mammals

Salt marsh harvest mouse (*Reithrodontomys raviventris*)

HABITAT AND BIOLOGY: Salt marsh harvest mouse (SMHM) is federally and state listed as endangered. There are two subspecies of salt marsh harvest mice: the northern salt marsh harvest mouse (*Reithrodontomys raviventris halicoetes*) lives in the marshes of the San Pablo and Suisun Bays, and the salt marsh harvest mouse (*R. r. raviventris*) is found in the marshes of Corte Madera, Richmond, and South San Francisco Bay. They forage mainly on leaves, seeds, and stems of plants that occur in salt and brackish marsh habitats. In winter, fresh green grasses are preferred. Pickleweed and saltgrass are the main food sources (Zeiner 1990). Recent trapping efforts have detected SMHM in significant numbers in brackish marshes and in marshes dominated by plants other than pickleweed, such as alkali bulrush (*Bolboschoenus maritimus*) and tri-corner bulrush (*Schoenoplectus americanus*) (Smith et al. 2018). This species does not burrow. SMHM builds nests of grass and sedges on the ground. The northern subspecies breeds from March through November (USFWS 2010b). SMHM is capable of drinking seawater. Marshlands with low salinities and sparse pickleweed are not utilized by the mice (Suisun Eco Workgroup, 2004). Barren areas mostly devoid of vegetation are generally avoided (USFWS 2010b). In marshes, with an upper zone of peripheral halophytes, mice use this vegetation to escape the higher tides, and may even spend a considerable portion of their lives there. Mice also move into the adjoining grasslands during the highest winter tides. Studies of radio-tagged SMHM indicate home range areas of 2,133 m² (0.53 acre; Bias and Morrison 1999). There are few data available on the distance that SMHM travel from salt marsh into terrestrial grassland. SMHM have been found seasonally using grasslands over 100 meters (328 feet) from any wetland edge in tidal marshes. The use of grasslands by salt marsh harvest mice in the spring has been interpreted as an opportunistic exploitation of a seasonally available resource, rather than use of an essential habitat (USFWS 2010b).

RANGE: SMHM is restricted to saline and brackish marsh habitats around San Francisco Bay. The northern sub-species is found in the brackish to saline marshes of San Pablo and Suisun bays at relatively high numbers (e.g., 18–181 mice per hectare; Smith et al. 2018). No critical habitat has been designated for SMHM.

KNOWN RECORDS: There are 63 CNDDDB records of SMHM within the 9-quad area surrounding the BSA. The closest record (Occurrence #112) is from 2010, approximately 0.46 mile southwest of the BSA at Hill Slough. A total of 15 mice were captured within the Hill Slough Wildlife Area. Surrounding habitat consisted of tidal marsh dominated primarily by *Salicornia* and *Distichlis*. The next nearest record (Occurrence #121) is approximately 1.6 miles west of the BSA at Hill Slough. No records occur north of SR 12. Regionally, records are clustered around tidal salt marshes and brackish marshes.

HABITAT PRESENT IN THE BSA: The coastal brackish marsh, alkali meadow, and southernmost seasonal wetlands located within the alkali meadow provide potentially suitable habitat for SMHM.

DISCUSSION: No potential SMHM individuals were observed during general biological surveys. The brackish marsh, alkali meadow, and southernmost seasonal wetlands are inundated or are in the vicinity of aquatic features that inundate throughout much of the year. These habitats contain plant species that could be consumed by SMHM for food including abundant saltgrass and small quantities of pickleweed. The alkali meadow adjacent to suitable marsh/wetland habitat provides potential food, cover, and nesting habitat for SMHM. Seasonally, and when sufficient vegetation cover is present, SMHM could use dense upland vegetation within approximately 328 feet of the potentially suitable wetland habitat. SMHM would not be expected to occur far from brackish water, and thus would not occur in the tilled agricultural fields present in the central and northern portions of the BSA, especially since these areas are generally sparsely vegetated and offer little cover.

Overall, habitat quality for SMHM in the BSA is poor. Very little pickleweed occurs in the BSA. The pickleweed is restricted to the areas adjacent to the brackish marsh and SR 12 at the southeast corner of the BSA, and where it does occur, it is sparse (approximately 1 individual plant every 25 square feet). The brackish marsh is of limited extent and much of it is open and heavily grazed by cattle, providing little cover. The drainage ditches generally contain freshwater species (*Alisma*, *Persicaria*, etc.), and do not contain brackish water or a preponderance of halophytes.

There are no records or known populations of SMHM north of SR 12 in the vicinity of the BSA. The highway may function as barrier to SMHM dispersal into the BSA from known populations to the south of SR 12 around Hill Slough.

The USFWS 2013 Recovery Plan identifies the southern portion of the BSA and portions of the drainage ditches as part of the SMHM Suisun Bay Area Recovery Unit Segment A. This portion of the study area generally coincides with the brackish marsh, saltgrass flats, and southern portion of the drainage ditches. The brackish marsh is identified as an area of Future Ecotone Restoration.

Despite poor habitat quality and the presence of dispersal barriers, SMHM could be present in potentially suitable habitat in the southern portion of the BSA.

Suisun shrew (*Sorex ornatus sinuosus*)

HABITAT AND BIOLOGY: Suisun shrew is a CDFW species of special concern. Suisun shrews inhabit salt and brackish marshes around the northern margins of San Pablo and Suisun bays. They prefer areas of low, dense vegetation, which provide adequate cover and nesting places along with plentiful supply of invertebrates. They are most often found at the junction between pickleweed marshes and upland levees vegetated with coyote brush (*Baccharis* sp.) and grasses. Driftwood and other upland areas are an important habitat feature for nesting and foraging. Contiguous upland habitats may provide important refuge during flooding of salt marshes (Collins 1998).

RANGE: Suisun shrew occurs in tidal and brackish marsh communities along the north shore of San Pablo and Suisun bays, from Sonoma Creek and Tubbs Island, Sonoma County on the west, eastward to Grizzly Island, Solano County (Collins 1998).

KNOWN RECORDS: There are 6 CNDDDB records of Suisun shrew within the 9-quad area surrounding the BSA. The closest record (Occurrence #5) is from 2010, approximately 3 miles west of the BSA in Suisun City salt marsh, adjacent to Cordelia Street.

HABITAT PRESENT IN THE BSA: The coastal brackish marsh, alkali meadow, and southernmost seasonal wetlands provide potentially suitable habitat for Suisun shrew.

DISCUSSION: No potential Suisun shrew individuals were observed during general biological surveys. The brackish marsh, alkali meadow, and southernmost seasonal wetlands are inundated or are in the vicinity of aquatic features that inundate throughout much of the year and contain the low, dense vegetation preferred by the shrew. Suisun shrew would not be expected to occur far from brackish water, and thus would not occur in the tilled agricultural fields present in the central and northern portions of the BSA, especially since these areas are generally sparsely vegetated and offer little cover.

American badger (*Taxidea taxus*)

HABITAT AND BIOLOGY: The American badger is a CDFW species of special concern (CDFW 2021) that occupies grasslands and open stages of shrub and forest habitats with friable soils. Badgers can be active at any hour but are primarily nocturnal. When inactive, badgers dig and occupy underground burrows, sometimes reusing existing burrows but often digging new burrows nightly (Messick and Hornocker 1981). Burrows are dug in areas with dry, often sandy, soils with sparse overstory cover. Badgers feed primarily on fossorial rodents such as ground squirrels and pocket gophers, which they hunt by digging. They also take voles, mice, birds, eggs, reptiles, and insects (CWHR 2021).

Mating occurs in summer and early fall, with delayed implantation. Some females are able to breed in their first year, but males do not sexually mature until their second year. Two to five young are born in natal dens in March and April. Females and kits occupy natal dens until May. Young badgers disperse from the natal den between July and August of their first or second year, sometimes staying within the range of their mother, other times dispersing up to 70 miles from the natal den (Messick and Hornocker 1981). Average home range sizes documented outside California vary from 0.74 square miles in Idaho to over 100 square miles in British Columbia (Messick and Hornocker 1981). Home ranges sizes of between 0.46 up to 6.83 square miles were documented in Monterey County, California (Quinn 2008). Family members may share the same territory as females, but males are generally solitary except during the breeding season. This species is tolerant of human activities, but is threatened by agricultural and urban development, road-kill, indiscriminate predator trapping, and poisoning (Williams 1986).

RANGE: American badger can be found throughout California, except for the northern coast area (CWHR 2021).

KNOWN RECORDS: There is 1 CNDDDB record of American badger within the 9-quad area surrounding the BSA. The record (Occurrence #535) is from 2016, approximately 9.2 miles north of the BSA in Vacaville. Relatively fresh diggings with badger tracks and hair were

observed in 2016 in a strip of eucalyptus trees in ruderal/non-native grasslands at edge of the airport. No occupied dens were found near the diggings.

HABITAT PRESENT IN THE BSA: American badger could create and occupy dens within the valley floor grassland. The entire BSA is suitable foraging habitat.

DISCUSSION: No American badgers or sign of American badgers were observed during general biological surveys, which included walking transects through the BSA spaced approximately 50 feet apart while searching for potentially suitable burrows. Especially in the southern portion of the BSA, a seasonally elevated water table may limit suitability for denning. The amount of development in the surrounding area and the limited prey base within the BSA greatly diminish the suitability of habitat in the BSA. No California ground squirrels were observed in the BSA. Only a few small patches of fossorial rodent mounds were observed. The central and northern portions of the BSA are regularly disked and subject to dryland farming. The prey base for badger in the BSA is very limited. Soils are generally hard and not friable, increasing the energy a badger would expend to excavate a den or hunt prey within the BSA.

D. Evaluation of Special-Status Plants

No State or federal listed special-status plant species were observed in the BSA during protocol botanical surveys conducted in October 2020 and March, April, July, and August 2021 (see Table 3 for dates and personnel), during the evident and identifiable period for special-status plants with potential to occur. Two CNPS California Rare Plant Rank 1B.2 plant species were identified and mapped in the BSA: pappose tarplant, *Centromadia parryi* ssp. *parryi*) and saline clover (*Trifolium hydrophilum*). Contra Costa goldfields were observed in the BSA in low abundance in 2006 – 2008. No Contra Costa goldfields have been observed since, including during the protocol botanical surveys in 2020/2021. A second set of surveys is scheduled for spring 2022. The plants with known occurrences on the site, as well as other special-status plant species with potential habitat present in the BSA are discussed below.

Ferris' milk-vetch (*Astragalus tener* var. *ferrisiae*)

HABITAT AND BIOLOGY: Ferris' milk-vetch is an annual herb found in vernal mesic meadows and seeps, valley and foothill grasslands, and alkaline flats from 6 to 246 feet. It blooms March through June (Jepson eFlora 2021); April through May (CNPS 2021a).

RANGE: This species is endemic to California. Ferris' milk-vetch is known from Butte, Colusa, Glenn, Sutter, and Yolo counties. It is presumed extirpated from Solano County (CNPS 2021a).

KNOWN RECORDS: There is 1 CNDDDB record of Ferris' milk vetch in the 9-quad area surrounding the BSA. The record (Occurrence #7) is from 1962, approximately 14 miles northeast of the BSA. Ferris' milk-vetch was collected from a vernal meadow 0.25 mile north of Bunker.

HABITAT PRESENT IN THE BSA: The valley floor grassland, alkali meadow, and seasonal wetlands provide potential habitat for Ferris' milk vetch.

DISCUSSION: Ferris' milk vetch was not observed in the BSA during the protocol botanical survey conducted during the evident and identifiable period.

Alkali milk-vetch (*Astragalus tener* var. *tener*)

HABITAT AND BIOLOGY: Alkali milk-vetch is an annual herb found in alkaline conditions of playas, adobe clay valley and foothill grassland, and vernal pools from 3 to 197 feet. It blooms March through June (Jepson eFlora 2021; CNPS 2021a).

RANGE: This species is endemic to California. Alkali milk vetch is known from Alameda, Merced, Napa, Solano, and Yolo counties. It is presumed extirpated from Contra Costa, Monterey, San Benito, Santa Clara, San Francisco, San Joaquin, Sonoma, and Stanislaus counties (CNPS 2021a).

KNOWN RECORDS: There are 65 CNDDDB records of this species in the 9-quad area surrounding the BSA. The closest (Occurrence #20) is from 2006, approximately 800 feet southeast of the BSA. Approximately 100 plants were observed scattered over a vernal flat southwest of the intersection of Scalley Road and Killdeer Road. The next nearest record (Occurrence #40) is from 1992, approximately 1.2 miles northwest of the BSA, 3 miles northeast of Suisun.

HABITAT PRESENT IN THE BSA: Portions of the valley floor grassland with elevated alkalinity, alkali meadow, and seasonal wetlands provide potential habitat for Alkali milk-vetch.

DISCUSSION: Alkali milk-vetch was not observed in the BSA during the protocol botanical survey conducted during the evident and identifiable period.

Heartscale (*Atriplex cordulata* var. *cordulata*)

HABITAT AND BIOLOGY: Heartscale is an annual herb found in saline or alkaline conditions of chenopod scrub, meadows and seeps, and sandy valley and foothill grassland from 0 to 1,837 feet. It blooms April through October (CNPS 2021a); June through July (Jepson eFlora 2021).

RANGE: This species is endemic to California. Heartscale is known from Alameda, Butte, Contra Costa, Colusa, Fresno, Glenn, Kern, Madera, Merced, Solano, and Tulare counties. It is presumed extirpated from San Joaquin, Stanislaus, and Yolo counties (CNPS 2021a).

KNOWN RECORDS: There are 10 CNDDDB records of this species within the 9-quad area surrounding the BSA. The closest (Occurrence # 79) is from 2006, approximately 800 feet southeast of the BSA. Heartscale was observed in an alkaline grassland at the edge of a vernal pool southwest of the intersection of Scalley Road and Killdeer Road. Dominants included *Hordeum marinum* ssp. *gussoneanum*, *Cotula cornopifolia*, and *Lasthenia californica*.

HABITAT PRESENT IN THE BSA: Portions of the valley floor grassland with elevated alkalinity, alkali meadow, and seasonal wetlands provide potential habitat for heartscale.

DISCUSSION: Heartscale was not observed in the BSA during the protocol botanical survey conducted during the evident and identifiable period.

Brittlescale (*Atriplex depressa*)

HABITAT AND BIOLOGY: Brittlescale is an annual herb found in alkaline and clay soils of chenopod scrub, meadows and seeps, playas, valley and foothill grassland, and vernal pools from 3 to 1,050 feet. It blooms April through October (CNPS 2021a); June through October (Jepson eFlora 2021).

RANGE: This species is endemic to California. Brittlescale is known from Alameda, Contra Costa, Colusa, Fresno, Glenn, Kern, Merced, Solano, Stanislaus, Tulare, and Yolo counties. (CNPS 2021a).

KNOWN RECORDS: There are 7 CNDDDB records of this species within the 9-quad area surrounding the BSA. The closest (Occurrence # 55), is from 1996, approximately 0.25 mile south of the BSA. A total of 213 plants were observed in an alkali playa along the east side of the access road to the Potrero Hills Landfill. In the wetlands, brittlescale was associated with *Polypogon monspeliensis*, *Salicornia europaea*, *S. Virginica*, and *Frankenia salina*. The next closest record (Occurrence #59) is from 1986, approximately 2 miles east of the BSA and 2 miles east of Highway 12 in the bed of a large vernal pool.

HABITAT PRESENT IN THE BSA: Portions of the valley floor grassland with elevated alkalinity, alkali meadow, and seasonal wetlands provide potential habitat for brittlescale.

DISCUSSION: Brittlescale was not observed in the BSA during the protocol botanical survey conducted during the evident and identifiable period.

Vernal pool smallscale (*Atriplex persistens*)

HABITAT AND BIOLOGY: Vernal pool smallscale is an annual herb found in alkaline vernal pools from 30 to 380 feet. It blooms June through October (CNPS 2021a; Jepson eFlora 2021).

RANGE: This species is endemic to California. Vernal pool smallscale is known from Colusa, Glenn, Madera, Merced, Solano, Stanislaus, and Tulare counties (CNPS 2021a).

KNOWN RECORDS: There are 4 CNDDDB records of this species within the 9-quad area surrounding the BSA. The closest (Occurrence #38) is from 2002, approximately 4 miles west of the BSA. A total of 200 plants were observed in a vernal pool on the south side of Cordelia Road between Suisun and Subeet. The plants were associated with *Hordeum marinum* ssp. *gussoneanum*, *H. depressum*, *Parapholis incurva*, *Frankenia salina*, *Lepidium oxycarpum*, *Lolium multiflorum*, *Salicornia virginica*, *Cotula coronopifolia*, *Distichlis spicata*, and *Juncus bufonius*.

HABITAT PRESENT IN THE BSA: The seasonal wetlands provide potential habitat for vernal pool smallscale.

DISCUSSION: Vernal pool smallscale was not observed in the BSA during the protocol botanical survey conducted during the evident and identifiable period.

Big tarplant (*Blepharizonia plumosa*)

HABITAT AND BIOLOGY: Big tarplant is an annual herb usually found in clay soils on dry slopes in valley and foothill grassland from 100 to 1,660 feet. It blooms July through November (CNPS 2021a, Jepson 2020).

RANGE: This species is endemic to California. Big tarplant is known from northwest San Joaquin Valley and eastern San Francisco Bay. It is presumed extirpated in Solano County.

KNOWN RECORDS: There are 3 CNDDDB records of this species within the 9-quad area surrounding the BSA. The closest (Occurrence #2) is from 1937, approximately 14 miles southeast of the BSA. Big tarplant was collected in an area near the town of Pittsburg. The exact location is unknown.

HABITAT PRESENT IN THE BSA: The valley floor grassland provides potential habitat for big tarplant.

DISCUSSION: Big tarplant was not observed in the BSA during the protocol botanical survey conducted during the evident and identifiable period.

Lyngbye's sedge (*Carex lyngbyei*)

HABITAT AND BIOLOGY: Lyngbye's sedge is a perennial rhizomatous herb found in brackish and freshwater marshes and swamps from 0 to 35 feet. It blooms April through August (CNPS 2021a); May through July (Jepson eFlora 2021).

RANGE: This species is known from Del Norte, Humboldt, Marin, Mendocino, Napa, and Solano counties (CNPS 2021a).

KNOWN RECORDS: There is one CNDDDB records of this species within the 9-quad area surrounding the BSA. The record (Occurrence #31) is from 2020, approximately 2 miles southwest of the BSA. Lyngbye's sedge was observed on the east side of Grizzly Island Road near Hill Slough and Rush Ranch Open Space just southeast of Suisun City.

HABITAT PRESENT IN THE BSA: The freshwater marsh in DD-01 and the coastal brackish marsh provide potential habitat for Lyngbye's sedge.

DISCUSSION: Lyngbye's sedge was not observed in the BSA during the protocol botanical survey conducted during the evident and identifiable period.

Congdon's tarplant (*Centromadia parryi* ssp. *congonii*)

HABITAT AND BIOLOGY: Congdon's tarplant is an annual herb found in alkaline valley and foothill grasslands from 3 to 754 feet. It blooms May through November (CNPS 2021a); June through October (Jepson eFlora 2021).

RANGE: This species is endemic to California. Congdon's tarplant is known from central western California. It is presumed extirpated from Santa Cruz and Solano counties (CNPS 2021a).

KNOWN RECORDS: There are 4 CNDDDB records of this species within the 9-quad area surrounding the BSA. The closest (Occurrence #98) is from 2015, approximately 2 miles southeast of the BSA. Congdon's tarplant was observed in grassland habitat on rolling hills with drainage channels. The habitat was dominated by *Avena* sp., *Bromus diandrus*, *Hordeum marinum*, and *Centaurea calcitrapa*.

HABITAT PRESENT IN THE BSA: Portions of the valley floor grassland with elevated alkalinity, alkali meadow, and seasonal wetlands provide potential habitat for Congdon's tarplant.

DISCUSSION: Congdon's tarplant was not observed in the BSA during the protocol botanical survey conducted during the evident and identifiable period.

Pappose tarplant (*Centromadia parryi* ssp. *parryi*)

HABITAT AND BIOLOGY: Pappose tarplant is an annual herb found on alkaline substrates in chaparral, coastal prairie, meadow and seeps, coastal salt marshes and swamps, and valley and vernal mesic foothill grasslands, and springs from sea level to 1,378 feet. It blooms May through November (CNPS 2021a); June through October (Jepson eFlora 2021).

RANGE: This species is endemic to California. Pappose tarplant is known from Butte, Colusa, Glenn, Lake, Napa, San Mateo, Solano, Sonoma, and Yolo counties (CNPS 2021a).

KNOWN RECORDS: There are 20 CNDDDB records of this species within the 9-quad area surrounding the BSA. The closest (Occurrence #26) is from 2006, approximately 800 feet southeast of the BSA. Pappose tarplant was observed growing in an alkaline grassland at the edge of a vernal pool southwest of the intersection between Scalley Road and Killdeer Road. The next closest record (Occurrence #2) is from 1999, approximately 1.9 miles southeast of the BSA and 2.7 miles southeast of Fairfield. The pappose tarplants in this record were observed in swales with *Lolium multiflorum*, *Hordeum marinum* spp. *gussoneanum*, *Distichlis spicata*, and *Frankenia salina*.

HABITAT PRESENT IN THE BSA: Portions of the valley floor grassland with elevated alkalinity, alkali meadow, and seasonal wetlands provide suitable habitat for pappose tarplant.

DISCUSSION: Approximately 6,196,679 pappose tarplant plants were mapped within the BSA in July and August 2021 (Figure 5; Appendix D, photos 26-28). The plants were observed throughout most of the BSA, with greater densities observed in the central and

eastern portions of the BSA. The plants were observed growing in the valley floor grassland, alkali meadow, and seasonal wetlands, sometimes in near monoculture. The pappose tarplant plants were in flower and early fruit. and shallow seasonal wetlands often with alkali mallow and Italian rye grass Pappose tarplant was not observed in the deepest seasonal wetlands present in the southernmost portion of the BSA. These southernmost seasonal wetlands are deeper and/or more hypersaline/hyperalkaline, potentially limiting suitability for pappose tarplant.

Plants were also observed in fall of 2020 at similar locations, at lower densities. Annual plant populations often fluctuate from year to year. The greater density of plants in 2021 may have been influenced by dryland farming practices and fire. Dryland farming in the BSA has involved disking and harvesting of grain crops in the early summer. Pappose tarplant begins as a prostrate rosette in spring, and thus may evade direct impacts from harvest while benefiting from the removal of competing plants. Both the fire that occurred in the southeast corner of the BSA in fall 2020 and the disking in the northern portion of the BSA expose the soil surface, which may promote germination and recruitment. The positive association of the pappose tarplant with agricultural tillage and harvest practices, which appears to encourage its growth, was clearly discernable at the edges of the disked fields and burned areas in July and August 2021.

Hispid salty bird's-beak (*Chloropyron molle* ssp. *hispidum*)

HABITAT AND BIOLOGY: Hispid salty birds-beak is an annual hemiparasitic herb found in alkaline conditions of meadows and seeps, playas, and valley and foothill grasslands from 3 to 510 feet. It blooms June through September (CNPS 2021a); June through July (Jepson eFlora 2021).

RANGE: This species is endemic to California. Hispid salty bird's-beak is known from Alameda, Fresno, Kern, Merced, Placer, and Solano counties. It has been extirpated from much of the lower San Joaquin Valley (CNPS 2021a).

KNOWN RECORDS: There is 1 CNDDDB record for this species in the 9-quad area surrounding the BSA. The record (Occurrence #13) is from 2010, approximately 4.6 miles east of the BSA. Hispid salty bird's-beak was observed growing in a vernal wet area in annual grassland on Pescadero clay on the margins of brackish marsh habitat 1.8 miles west of Creed Station on Creed Road.

HABITAT PRESENT IN THE BSA: Portions of the valley floor grassland with elevated alkalinity, alkali meadow, and seasonal wetlands provide potential habitat for Hispid salty birds-beak.

DISCUSSION: Hispid salty birds-beak was not observed in the BSA during the protocol botanical survey conducted during the evident and identifiable period.

Soft salty birds-beak (*Chloropyron molle* ssp. *molle*)

HABITAT AND BIOLOGY: Soft salty bird's-beak is an annual hemiparasitic herb found in coastal salt marshes and swamps from 0 to 10 feet. It blooms July through November (CNPS 2021a; Jepson eFlora 2021).

RANGE: This species is endemic to California. Soft salty bird's-beak is known from fewer than fifteen occurrences in Contra Costa, Marin, Napa, Sacramento, Solano, and Sonoma counties.

CRITICAL HABITAT: Critical habitat for soft salty bird's-beak was designated in 2007 (72 FR 18518 18553). The BSA does not contain federal designated critical habitat for soft salty bird's-beak. The nearest critical habitat occurs approximately 0.3 miles southwest.

KNOWN RECORDS: There are 17 CNDDDB records for this species in the 9-quad area surrounding the BSA. The closest record (Occurrence #19) from 2012, is located approximately 0.5 mile southwest of the BSA. An unknown number of plants were seen in the Suisun Marsh north of Hill Sough. The plants were growing in the salt marsh in association with *Salicornia virginica*, *Distichlis spicata*, *Cuscuta salina major*, *Jaumea carnosa*, *Polypogon monspeliensis*, *Scirpus americanus*, and *Atriplex triangularis*. The next nearest record (Occurrence #21) from 2011 is also located in the Suisun Marsh, approximately 1.1 mile south of the BSA. Approximately 53,031 plants were seen with *Salicornia virginica*, *Distichlis spicata*, *Cuscuta salina Major*, *Jaumea carnosa*, *Polypogon monspeliensis*, *Scirpus Americanus*, and *Atriplex Triangularis*.

HABITAT PRESENT IN THE BSA: The alkali meadow, seasonal wetlands, and coastal brackish marsh provide potential habitat for soft salty bird's-beak.

DISCUSSION: Soft salty bird's-beak was not observed in the BSA during the protocol botanical survey conducted during the evident and identifiable period.

Bolander's water-hemlock (*Cicuta maculata* var. *bolanderi*)

HABITAT AND BIOLOGY: Bolander's water-hemlock is a perennial herb found in coastal, fresh or brackish water marshes and swamps from 0 to 656 feet. It blooms July through September (CNPS 2021a; Jepson eFlora 2021).

RANGE: Bolander's water-hemlock is known from Contra Costa, Marin, Sacramento, and Solano counties. It is presumed extirpated from Santa Barbara County (CNPS 2021a).

KNOWN RECORDS: There are 7 CNDDDB records of Bolander's water-hemlock in the 9-quad area surrounding the BSA. The closest (Occurrence #11) is from 2009, approximately 2.8 miles southwest of the BSA. A few Bolander's water-hemlock plants were observed in Suisun Slough 0.6 mile northwest of Rush Ranch Visitor Center. The plants were growing in high brackish marsh in association with *Juncus arcticus* ssp. *balticus*, *Distichlis spicata*, *Lycopus asper*, and *Pluchea odorata*.

HABITAT PRESENT IN THE BSA: The freshwater marsh in DD-01 and the coastal brackish marsh provide potential habitat for Bolander's water-hemlock.

DISCUSSION: Bolander's water-hemlock was not observed in the BSA during the protocol botanical survey conducted during the evident and identifiable period.

Suisun thistle (*Cirsium hydrophilum* var. *hydrophilum*)

HABITAT AND BIOLOGY: Suisun thistle is a perennial herb found in salt marshes and swamps from 0 to 3 feet. It blooms June through September (CNPS 2021a; Jepson eFlora 2021).

RANGE: This species is endemic to California. Suisun thistle is known from two occurrences in the Suisun Marsh in Solano County (CNPS 2021a).

CRITICAL HABITAT: Critical habitat for Suisun thistle was designated in 2007 (72 FR 18518 18553). The BSA does not contain federal designated critical habitat for Suisun thistle. The nearest critical habitat occurs approximately 0.3 miles to the southwest.

KNOWN RECORDS: There are 3 CNDDDB records for this species in the 9-quad area surrounding the BSA. The closest (Occurrence #7) is from 2019, approximately 0.6 mile south of the BSA. A total of 37 flowering plants were observed in the Hill Slough Wildlife Area. The plants were growing in association with *Potentilla anserina*, *Calystegia sepium*, *Grindelia stricta*, *Schoenoplectus americanus*, and *Apium graveolens* above the slope of a brackish tidal marsh.

HABITAT PRESENT IN THE BSA: The coastal brackish marsh provides potential habitat for Suisun thistle.

DISCUSSION: Suisun thistle was not observed in the BSA during the protocol botanical survey conducted during the evident and identifiable period.

Recurved larkspur (*Delphinium recurvatum*)

HABITAT AND BIOLOGY: Recurved larkspur is a perennial herb found in alkaline chenopod scrub, cismontane woodland, and valley and foothill grassland from 10 to 2,450 feet. It grows in poorly drained, fine, alkaline soils. It blooms March through June (CNPS 2021a; Jepson eFlora 2021).

RANGE: This species is endemic to California. Recurved larkspur is known from Alameda, Butte, Contra Costa, Colusa, Fresno, Glenn, Kings, Kern, Madera, Merced, Monterey, San Joaquin, San Luis Obispo, Solano, and Tulare counties (CNPS 2021a).

KNOWN RECORDS: There is 1 CNDDDB record for this species in the 9-quad area surrounding the BSA. The record (Occurrence #1) is from 1940, approximately 8 miles north of the BSA. Recurved larkspur was collected along the roadside in clay soil north of Vacaville. The exact location is unknown.

HABITAT PRESENT IN THE BSA: Portions of the valley floor grassland with elevated alkalinity and alkali meadow provide potential habitat for recurved larkspur.

DISCUSSION: Recurved larkspur was not observed in the BSA during the protocol botanical survey conducted during the evident and identifiable period.

Dwarf downingia (*Downingia pusilla*)

HABITAT AND BIOLOGY: Dwarf downingia is an annual herb found in mesic valley and foothill grasslands and vernal pools from 3 to 1,450 feet. It blooms from March through May (CNPS 2021a; Jepson eFlora 2021).

RANGE: Dwarf downingia is known from Amador, Fresno, Merced, Napa, Placer, Sacramento, San Joaquin, Solano, Sonoma, Stanislaus, Tehama, and Yuba counties.

KNOWN RECORDS: There are 22 CNDDDB records for this species in the 9-quad area surrounding the BSA. The closest record (Occurrence #1) is from 1893, approximately 2.3 miles north of the BSA. The record is for a dwarf downingia collection at an unknown location south of Vacaville.

HABITAT PRESENT IN THE BSA: The valley floor grassland, alkali meadow, and seasonal wetlands provide potential habitat for dwarf downingia.

DISCUSSION: Dwarf downingia was not observed in the BSA during the protocol botanical survey conducted during the evident and identifiable period.

Jepson's coyote-thistle (*Eryngium jepsonii*)

HABITAT AND BIOLOGY: Jepson's coyote-thistle is a perennial herb found in clay soils in valley and foothill grassland and vernal pools from 10 to 985 feet. It blooms April through August (CNPS 2021a; Jepson eFlora 2021).

RANGE: This species is known from Alameda, Contra Costa, Napa, San Mateo, Solano, and Yolo counties (CNPS 2021a).

KNOWN RECORDS: There is one CNDDDB records of this species within the 9-quad area surrounding the BSA. The record (Occurrence #14) is from 1938, approximately 7.5 miles southwest of the BSA. Jepson's coyote-thistle was observed in in a dry ditch near Cordelia.

HABITAT PRESENT IN THE BSA: The valley floor grassland, alkali meadow, and seasonal wetlands provide potential habitat for Jepson's coyote-thistle.

DISCUSSION: Jepson's coyote-thistle was not observed in the BSA during the protocol botanical survey conducted during the evident and identifiable period.

Diamond-petaled California poppy (*Eschscholzia rhombipetala*)

HABITAT AND BIOLOGY: Diamond-petaled California poppy is an annual herb found in alkaline, clay soils of valley and foothill grassland from 0 to 3,200 feet. It blooms March through April (CNPS 2021a; Jepson eFlora 2021).

RANGE: This species is endemic to California. It is known from Alameda, San Joaquin, and San Luis Obispo counties. It is presumed extirpated from Colusa, Contra Costa, and Stanislaus counties (CNPS 2021a).

KNOWN RECORDS: There is 1 CNDDDB record for this species in the 9-quad area surrounding the BSA. The record (Occurrence #3) is from 1994, approximately 18.4 miles

southeast of the BSA. Diamond-petaled California poppy was observed around the Antioch dunes. The exact location is unknown.

HABITAT PRESENT IN THE BSA: Portions of the valley floor grassland with elevated alkalinity and alkali meadow provide potential habitat for diamond-petaled California poppy.

DISCUSSION: Diamond-petaled California poppy was not observed in the BSA during the protocol botanical survey conducted during the evident and identifiable period.

San Joaquin spearscale (*Extriplex joaquinana*)

HABITAT AND BIOLOGY San Joaquin spearscale is an annual herb found in alkaline soils in chenopod scrub, meadows and seeps, playas, and valley and foothill grassland from 3 to 2,740 feet. It blooms April through September (Jepson eFlora 2021); April through October (CNPS 2021a).

RANGE: This species is endemic to California. San Joaquin spearscale is known from Alameda, Contra Costa, Colusa, Fresno, Glenn, Merced, Monterey, Napa, San Benito, Solano, Yolo and possibly San Luis Obispo counties. It is presumed extirpated in Santa Clara, San Joaquin, and Tulare counties (CNPS 2021a).

KNOWN RECORDS: There are 10 CNDDDB records for San Joaquin spearscale in the 9-quad area surrounding the BSA. The closest (Occurrence #49) is from 2004, approximately 1 mile south of the BSA. Approximately 900 San Joaquin spearscale plants were observed in a field on the west side of Scally Road, just south of Killdeer Road in seasonal alkali grassland with *Lolium multiflorum*, *Bromus hordeaceus*, *Frankenia salina*, *Parapholis incurva*, and *Salicornia virginica*.

HABITAT PRESENT IN THE BSA: Portions of the valley floor grassland with elevated alkalinity, alkali meadow, and seasonal wetlands provide potential habitat for San Joaquin spearscale.

DISCUSSION: San Joaquin spearscale was not observed in the BSA during the protocol botanical survey conducted during the evident and identifiable period.

Boggs Lake hedge-hyssop (*Gratiola heterosepala*)

HABITAT AND BIOLOGY: Boggs Lake hedge-hyssop is an annual herb found in clay substrates at the margins of lakes, marshes, swamps, and vernal pools from 30 to 7,790 feet. It blooms from April through August (CNPS 2021a); April through September (Jepson eFlora 2021).

RANGE: Boggs Lake hedge-hyssop is known from Fresno, Lake, Lassen, Madera, Mendocino, Merced, Modoc, Placer, Sacramento, Shasta, Siskiyou, San Joaquin, Solano, Sonoma, and Tehama counties (CNPS 2021a).

KNOWN RECORDS: There are 6 CNDDDB records for Boggs Lake hedge-hyssop in the 9-quad area surrounding the BSA. The closest (Occurrence #39) is from 1991, approximately

7.1 miles northeast of the BSA. The record is for Boggs Lake hedge-hyssop that was observed at the end of Dally Road, south of Hay Road in a sparsely vegetated portion of small playa-type vernal pool with *Lasthenia glaberrima*, *Pleuropogon californicus*, *Eleocharis macrostachya*, and *Downingia cuspidata*.

HABITAT PRESENT IN THE BSA: The seasonal wetlands and freshwater marsh provide potential habitat for Boggs Lake hedge-hyssop.

DISCUSSION: Boggs Lake hedge-hyssop was not observed in the BSA during the protocol botanical survey conducted during the evident and identifiable period.

Hogwallow starfish (*Hesperovax caulescens*)

HABITAT AND BIOLOGY: Hogwallow starfish is an annual herb found in mesic clay substrates in valley and foothill grassland and in shallow vernal pools, sometimes in high alkaline areas, from 0 to 1,655 feet. It blooms from March through June (CNPS 2021a); May through June (Jepson eFlora 2021).

RANGE: This species is endemic to California. Hogwallow starfish is known from Alameda, Lake, Monterey, Napa, Placer, Sacramento, Santa Clara, Shasta, San Joaquin, San Mateo, Solano, Sonoma, Stanislaus, Tehama, and Yuba counties. It is presumed extirpated from Stanislaus County (CNPS 2021a).

KNOWN RECORDS: The CNDDDB does not track records of hogwallow starfish. The nearest herbarium specimen logged in the Consortium of California Herbaria is from 1895 at a location noted as ‘Suisun’ about 1 mile northwest of the BSA in an area that has been developed (CCH 2021).

HABITAT PRESENT IN THE BSA: The valley floor grassland, seasonal wetlands, and alkali meadow provide potential habitat for hogwallow starfish.

DISCUSSION: Hogwallow starfish was not observed in the BSA during the protocol botanical survey conducted during the evident and identifiable period.

Woolly rose-mallow (*Hibiscus lasiocarpus* var. *occidentalis*)

HABITAT AND BIOLOGY: Woolly rose-mallow is a perennial rhizomatous herb found in freshwater marshes, wet banks, swamps, wetlands, and in riprap on sides of levees, from sea level to 395 feet. It blooms from June through September (CNPS 2021a); July through November (Jepson eFlora 2021).

RANGE: This species is endemic to California. Woolly rose-mallow is known from Butte, Contra Costa, Colusa, Glenn, Sacramento, San Joaquin, Solano, Sutter, and Yolo counties (CNPS 2021a).

KNOWN RECORDS: There is 1 CNDDDB record for woolly rose-mallow in the 9-quad area surrounding the BSA. The record (Occurrence #188) is from 2005, approximately 11.3 miles east of the BSA. A single woolly rose-mallow plant was observed near Calhoun Cut just west of the confluence with Barker Slough and about 1.3 air miles northwest of Peterson

Ranch in a stand of *Alnus rhombifolia* and *Rosa californica* on the south side of the waterway.

HABITAT PRESENT IN THE BSA: The freshwater marsh provides potential habitat for woolly rose-mallow.

DISCUSSION: Woolly rose-mallow was not observed in the BSA during the protocol botanical survey conducted during the evident and identifiable period.

Carquinez goldenbush (*Isocoma arguta*)

HABITAT AND BIOLOGY: Carquinez goldenbush is a perennial shrub found in alkaline soils of valley and foothill grassland from sea level to 70 feet. It blooms August through December (CNPS 2021a; Jepson eFlora 2021).

RANGE: This species is endemic to California. Known from Contra Costa and Solano counties (CNPS 2021a).

KNOWN RECORDS: There are 14 CNDDDB records of Carquinez goldenbush within the 9-quad area surrounding the BSA. The closest (Occurrence #6) is from 1994, approximately 2.6 miles southeast of the BSA. The record is for 85 plants observed in hummocky annual grassland on mounds surrounded by vernal wet swales in Solano loam soil on the north side of Highway 12. associated with *Bromus*, *Distichlis spicata*, *Avena*, and *Hemizonia*.

HABITAT PRESENT IN THE BSA: Portions of the valley floor grassland with elevated alkalinity, alkali meadow, and seasonal wetlands provide potential habitat for Carquinez goldenbush.

DISCUSSION: Carquinez goldenbush was not observed in the BSA during the protocol botanical survey conducted during the evident and identifiable period.

Alkali-sink goldfields (*Lasthenia chrysantha*)

HABITAT AND BIOLOGY: Alkali-sink goldfields is an annual herb found in alkaline vernal pools from 0 to 655 feet (CNPS 2021a). Its habitat is also described as “wet saline flats” (Jepson eFlora 2021). It blooms February through April (CNPS 2021a; Jepson eFlora 2021).

RANGE: Alkali-sink goldfields Fresno, Kern, Kings, Madera, Merced, Sacramento, Solano, Stanislaus, and Tulare counties (CNPS 2021a).

KNOWN RECORDS: There is 1 CNDDDB record of alkali-sink goldfields within the 9-quad area surrounding the BSA. The record (Occurrence #55) is from an unknown date, approximately 7.8 miles northeast of the BSA. Alkali-sink goldfields plants were mapped around the western portion of the Calhoun Cut Ecological Reserve. The exact date, location, and number of plants are unknown.

HABITAT PRESENT IN THE BSA: Portions of the valley floor grassland with elevated alkalinity, alkali meadow, and seasonal wetlands provide potential habitat for Coulter goldfields.

DISCUSSION: No alkali-sink goldfields plants were observed in the BSA during the protocol botanical survey conducted during the evident and identifiable period.

Contra Costa goldfields (*Lasthenia conjugens*)

HABITAT AND BIOLOGY: Contra-Costa goldfields is an annual herb found in mesic habitats of cismontane woodland, alkaline playas, valley and foothill grassland, and vernal pools from 0 to 1,540 feet. It blooms March through June (CNPS 2021a; Jepson eFlora 2021). This species most likely forms a persistent soil seed bank (USFWS 2005; LSA Associates Inc. 2010). The maximum duration of viable seed in the soil is not known.

RANGE: This species is endemic to California. It is known from Alameda, Contra Costa, Mendocino, Monterey, Marin, Napa, Santa Barbara, Santa Clara, Solano, and Sonoma counties (CNPS 2021a).

CRITICAL HABITAT: Critical habitat for Contra Costa goldfields was designated in 2006 (71 FR 7118 7316). The BSA contains federal designated critical habitat for Contra Costa goldfields. The critical habitat occurs throughout the entire BSA. The primary constituent elements (physical and biological features) essential for the species are: 1) Topographic features characterized by isolated mound and intermound complex within a matrix of surrounding uplands that result in continuously, or intermittently, flowing surface water in the depressional features including swales connecting the pools described below, providing for dispersal and promoting hydroperiods of adequate length in the pools; 2) Depressional features including isolated vernal pools with underlying restrictive soil layers that become inundated during winter rains and that continuously hold water or whose soils are saturated for a period long enough to promote germination, flowering, and seed production of predominantly annual native wetland species and typically exclude both native and nonnative upland plant species in all but the driest years. As these features are inundated on a seasonal basis, they do not promote the development of obligate wetland vegetation habitats typical of permanently flooded emergent wetlands.

KNOWN RECORDS: There are 16 CNDDDB records of Contra-Costa goldfields within the 9-quadrant area surrounding the BSA. The closest CNDDDB record (Occurrence #42) is approximately 0.6 mile east of the BSA. The record is for approximately 4,000 plants observed in vernal pools southwest of the south gate entrance to Travis Air Force Base in 2016.

Outside of the CNDDDB, there is also a known record for plants observed in the BSA based on surveys conducted by LSA Associates in May 2006, March/April 2007, and May 2008 (LSA Associates Inc. 2010). The Contra Costa goldfield plants observed in the BSA were in scattered wetlands on the north half of the site. Most of the goldfields observed on the site during the LSA surveys were common Fremont's goldfields (*Lasthenia fremontii*). The report does not indicate the number of plants observed in the BSA (the BSA is a portion of the area described in the LSA report as the Peterson and Johnson Trust lands (West). The 2010 LSA report describes the following regarding the plants observed in the BSA:

[...] historic leveling of the land has drastically decreased the natural pool/swale topography characteristic of more pristine vernal pool habitats. For example, instead of discrete pools, there are large expanses of grassland that contain marginal wetland characteristics (LSA 2008). The southern portions of the Peterson and Johnson Trust lands (West), Parker Ranch, and the northern portion of the Director's Guild study site are excellent examples of this [...] on the Peterson and Johnson Trust lands (West), the southern portions of the site (north of Hwy 12), show characteristics of being a large seasonal wetland; however, only small portions of the site support significant stands of [Contra Costa goldfields]. (LSA 2010)

HABITAT PRESENT IN THE BSA: The valley floor grassland, alkali meadow, and seasonal wetlands provide potential habitat for Contra Costa goldfields.

DISCUSSION: No Contra Costa goldfields plants were observed in the BSA during the botanical survey conducted in March and April 2021 during the evident and identifiable period. The survey included a visit to a nearby reference population located approximately 0.75 mile southeast of the BSA in alkali playa habitat along Scally Lane. Contra Costa goldfields plants were observed in flower in the reference population on 22 April 2021.

No Contra Costa goldfields were observed in 2021 in the areas where LSA previously found plants in 2006 – 2008. The northern portion of the BSA where these plants were found has been repeatedly disked and planted with a grain crop since the 2006 – 2008 surveys. The few seasonal wetlands in the northern part of the BSA are shallow and degraded by disking and invasion by competitive nonnative species including Italian ryegrass. Italian ryegrass occurs in abundance in the BSA and is negatively correlated with Contra Costa goldfield abundance (LSA 2010). The northern portions of the BSA where Contra Costa goldfields were observed in 2006 – 2008 provide marginal habitat for Contra Costa goldfields. Given the low abundance observed in 2006 – 2008 and the ongoing disking/dryland farming, it is unlikely that a viable seedbank of Contra Costa goldfields remains in the BSA. Only a few common Fremont's goldfields, which were reported abundant on the site in 2006 – 2008 (LSA 2010) were observed in the northern portion of the site in 2021 (see Appendix D, Photo 4 for example).

Seasonal wetlands located in the southern portion of the BSA, outside of the areas subject to ongoing disking/dryland farming may provide suitable habitat for Contra Costa goldfields. Common Fremont's goldfields and smooth goldfields (*Lasthenia glaberrima*) were observed in the deeper seasonal wetlands in the southern portion of the BSA. There are no known records of Contra Costa goldfields in the southern portion of the BSA and no Contra Costa goldfields were observed in the southern portion of the BSA during the March and April 2021 surveys conducted by SWCA, or during the 2006 – 2008 surveys conducted by LSA.

Ferris' goldfields (*Lasthenia ferrisiae*)

HABITAT AND BIOLOGY: Ferris' goldfields is an annual herb found in alkaline, clay substrates in vernal pools from 65 to 2,295 feet (CNPS 2021a). It blooms February through May (CNPS 2021a; Jepson eFlora 2021).

RANGE: Ferris' goldfields is known from Alameda, Butte, Colusa, Contra Costa, Fresno, Kern, Kings, Merced, Monterey, Sacramento, San Joaquin, San Luis Obispo, Solano, Stanislaus, Tulare, and Yolo counties (CNPS 2021a).

KNOWN RECORDS: The CNDDDB does not track records of Ferris' goldfields. The nearest herbarium specimen logged in the Consortium of California Herbaria is from 1971, about 30 miles southeast of the BSA near Byron, CA. The plants were growing in valley grassland along Highway 4 (CCH 2021).

HABITAT PRESENT IN THE BSA: The valley floor grassland, alkali meadow, and seasonal wetlands provide potential habitat for Ferris' goldfields.

DISCUSSION: No Ferris' goldfields plants were observed in the BSA during the protocol botanical survey conducted during the evident and identifiable period.

Coulter goldfields (*Lasthenia glabrata* ssp. *coulteri*)

HABITAT AND BIOLOGY: Coulter goldfields is an annual herb found in coastal salt marshes and swamps, playas, and vernal pools from 1 to 4,002 feet (CNPS 2021a). Its habitat is also described as "saline places, vernal pools" (Jepson eFlora 2021). It blooms February through June (CNPS 2021a); April through May (Jepson eFlora 2021).

RANGE: Coulter goldfields is known from Colusa, Merced, Orange, Riverside, Santa Barbara, San Diego, San Luis Obispo, Santa Rosa Island, Solano, Tehama, Ventura, and Yolo counties. It may also occur in Tulare County, where distribution or identity is uncertain. It is presumed extirpated in Kern, Los Angeles, and San Bernardino counties (CNPS 2021a).

KNOWN RECORDS: There is 1 CNDDDB record of Coulter goldfields within the 9-quad area surrounding the BSA. The record (Occurrence #124) is from 2018, approximately 4.5 miles east of the BSA. Coulter goldfields plants were mapped around the Wilcox Ranch Preserve. The exact location is unknown.

HABITAT PRESENT IN THE BSA: The valley floor grassland, alkali meadow, and seasonal wetlands provide potential habitat for Coulter goldfields.

DISCUSSION: No Coulter goldfields plants were observed in the BSA during the protocol botanical survey conducted during the evident and identifiable period.

Delta tule pea (*Lathyrus jepsonii* var. *jepsonii*)

HABITAT AND BIOLOGY: Delta tule pea is a perennial herb found in freshwater and brackish marshes and swamps from 0 to 13 feet. It blooms May through July and sometimes September (CNPS 2021a; Jepson eFlora 2021).

RANGE: This species is endemic to California. It is known from Alameda, Contra Costa, Napa, Sacramento, Santa Clara, San Joaquin, Solano, and Sonoma counties (CNPS 2021a).

KNOWN RECORDS: There are 74 CNDDDB records of Delta tule pea within the 9-quad area surrounding the BSA. The closest (Occurrence #101) is from 2000, approximately 1.8 miles

southeast of the BSA. An unknown number of plants were observed near Hill Slough about 0.9 mile northeast of Suisun Hill in Suisun Marsh.

HABITAT PRESENT IN THE BSA: The freshwater marsh in DD-01 and the coastal brackish marsh provide potential suitable habitat for Delta tule pea.

DISCUSSION: Delta tule pea was not observed in the BSA during the protocol botanical survey conducted during the evident and identifiable period.

Legenere (*Legenere limosa*)

HABITAT AND BIOLOGY: Legenere is an annual herb found in vernal pools from 3 to 2,880 feet. It blooms from April through June (CNPS 2021a); May through June (Jepson eFlora 2021).

RANGE: This species is endemic to California. Legenere is known from Alameda, Lake, Monterey, Napa, Placer, Sacramento, Santa Clara, Shasta, San Joaquin, San Mateo, Solano, Sonoma, Stanislaus, Tehama, and Yuba counties. It is presumed extirpated from Stanislaus County (CNPS 2021a).

KNOWN RECORDS: There are 12 CNDDDB records of legenere within the 9-quad area surrounding the BSA. The closest (Occurrence #2) is from 1892, is approximately 1.7 miles west of the BSA. Legenere was mapped in the trenches along the railroad about 1 mile northeast of Suisun Station.

HABITAT PRESENT IN THE BSA: The seasonal wetlands provide potential habitat for legenere.

DISCUSSION: Legenere was not observed in the BSA during the protocol botanical survey conducted during the evident and identifiable period.

Heckard's pepper-grass (*Lepidium latipes* var. *heckardii*)

HABITAT AND BIOLOGY: Heckard's pepper-grass is an annual herb found in valley and foothill grassland (alkaline flats) from 6 to 650 feet. It blooms from March through May (CNPS 2021a); March through June (Jepson eFlora 2021).

RANGE: This species is endemic to California. It is known from Glenn, Merced, Sacramento, Solano, and Yolo counties (CNPS 2021a).

KNOWN RECORDS: There are 2 CNDDDB records of Heckard's pepper-grass within the 9-quad area surrounding the BSA. The closest (Occurrence #9) is from 2002, approximately 6.7 miles southwest of the BSA. The record is for an unknown number of plants that were observed in alkaline vernal flats along with *Lasthenia fremontii*, *Blennosperma nanum*, *Lolium multiflorum*, *Pleuropogon*, *Deschampsia danthonioides*, *Lepidium nitidum*, *Lepidium oxycarpum*, *Frankenia salina*, *Cressa truxillensis*, *Alopecurus saccatus*, and *Cotula coronopifolia*.

HABITAT PRESENT IN THE BSA: Portions of the valley floor grassland with elevated alkalinity, alkali meadow, and seasonal wetlands provide potential habitat for Heckard's pepper-grass.

DISCUSSION: Heckard's pepper-grass was not observed in the BSA during the protocol botanical survey conducted during the evident and identifiable period.

Showy golden madia (*Madia radiata*)

HABITAT AND BIOLOGY: Showy golden madia is an annual herb found in cismontane woodland valleys and foothill grasslands from 82 to 2,952 feet. It blooms March through May (CNPS 2021a; Jepson eFlora 2021).

RANGE: This species is endemic to California. Showy golden madia is known from Fresno, Kern, San Benito, Santa Clara, San Luis Obispo, and Stanislaus counties. It is presumed extirpated from Contra Costa, Kings, Monterey, Santa Barbara, and San Joaquin counties (CNPS 2021a).

KNOWN RECORDS: There are no CNDDDB records of showy golden madia within the 9-quad area surrounding the BSA. According to the Consortium of California Herbaria (specimen number UC112946), the closest collection is from 1908, approximately 18 miles southwest of the BSA near Antioch. The plants were observed at the borders of cultivated fields (CCH 2021).

HABITAT PRESENT IN THE BSA: The valley floor grassland provides potential habitat for showy golden madia.

DISCUSSION: Showy golden madia was not observed in the BSA during the protocol botanical survey conducted during the evident and identifiable period.

Marsh microseris (*Microseris paludosa*)

HABITAT AND BIOLOGY: Marsh microseris is a perennial herb found in closed-cone coniferous forest, cismontane woodland, coastal scrub, and moist valley and foothill grassland from 10 to 1,000 feet. Hayes and Taylor (2006) describe habitat as vernal moist to saturated sites in coastal terrace prairie along the coast. It blooms April through July (Baldwin et al. 2012; CNPS 2021a); April through June (Jepson eFlora 2021).

RANGE: This species is endemic to California. It is known from Mendocino, Monterey, Marin, San Benito, Santa Cruz, San Luis Obispo, Solano and Sonoma counties. It is presumed extirpated in San Francisco and San Mateo counties (CNPS 2021a).

KNOWN RECORDS: There is 1 CNDDDB record of marsh microseris within the 9-quad area surrounding the BSA. The record (Occurrence #39) is from 2007, approximately 0.8 mile southeast of the BSA. Marsh microseris was observed in grassland habitat 0.25 mile east of Scally Road, north of Highway 12 and east of Suisun City.

HABITAT PRESENT IN THE BSA: The valley floor grassland, alkali meadow, and seasonal wetlands provide potential habitat for marsh microseris.

DISCUSSION: Marsh microseris was not observed in the BSA during the protocol botanical survey conducted during the evident and identifiable period.

Baker's navarretia (*Navarretia leucocephala* ssp. *bakeri*)

HABITAT AND BIOLOGY: Baker's navarretia is an annual herb found in mesic habitats of cismontane woodland, lower montane coniferous forest, meadows and seeps, valley and foothill grassland, and vernal pools from 15 to 5,700 feet. It blooms April through July (CNPS 2021a; Jepson eFlora 2021).

RANGE: This species is endemic to California. Baker's navarretia is known from Colusa, Glenn, Lake, Lassen, Mendocino, Marin, Napa, Solano, Sonoma, Sutter, Tehema, and Yolo counties.

KNOWN RECORDS: There are 11 CNDDDB records of Baker's navarretia within the 9-quad area surrounding the BSA. The closest record (Occurrence #42) is from 1930, approximately 2.7 miles north of the BSA. Baker's navarretia was observed in a dry vernal pool near Vacaville. The exact location is unknown.

HABITAT PRESENT IN THE BSA: The valley floor grassland, alkali meadow, and seasonal wetlands provide potential habitat for Baker's navarretia.

DISCUSSION: Baker's navarretia was not observed in the BSA during the protocol botanical survey conducted during the evident and identifiable period.

Colusa grass (*Neostapfia colusana*)

HABITAT AND BIOLOGY: Colusa grass is an annual herb found in large adobe vernal pools from 15 to 660 feet. It blooms May through August (CNPS 2021a; Jepson eFlora 2021). Members of the Orcuttieae tribe inhabit large vernal pools or playas with inundation lasting until May or June, in areas of the pools where other plants are almost entirely absent. In the Sacramento Valley Colusa grass is known from the rim of alkaline basins (USFWS 2005a).

RANGE: This species is endemic to California. Colusa grass is known from Glenn, Merced, Solano, Stanislaus, and Yolo counties. It is presumed extirpated from Colusa County (CNPS 2021a).

CRITICAL HABITAT: Critical habitat for Colusa grass was designated in 2006 (71 FR 7118 7316). The BSA does not contain federal designated critical habitat for Colusa grass. The nearest critical habitat occurs approximately 23.5 miles northeast.

KNOWN RECORDS: There are 4 CNDDDB records of Colusa grass within the 9-quad area surrounding the BSA. The closest (Occurrence #48) is from 2010, approximately 6.1 miles east of the BSA. One plant was observed in a saline-alkaline playa in annual grassland located southwest of Olcott Lake.

HABITAT PRESENT IN THE BSA: The deeper seasonal wetlands in the southern portion of the BSA provide potential habitat for Colusa grass.

DISCUSSION: Colusa grass was not observed in the BSA during the protocol botanical survey conducted during the evident and identifiable period. Seasonal wetlands in the central and northern portion of the BSA do not inundate at sufficient depths or durations to support this species.

San Joaquin Valley Orcutt grass (*Orcuttia inaequalis*)

HABITAT AND BIOLOGY: San Joaquin Valley Orcutt grass is an annual herb found in vernal pools from 30 to 2,475 feet. It blooms April through September (CNPS 2021a, Jepson eFlora 2021). Members of the Orcuttieae tribe inhabit large vernal pools or playas with inundation lasting until May or June, in areas of the pools where other plants are almost entirely absent (USFWS 2005a).

RANGE: This species is endemic to California. San Joaquin Valley Orcutt grass is known from Fresno, Madera, Merced, Solano, and Tulare counties. It is presumed extirpated in Stanislaus County (CNPS 2021a). Nearly all occurrences of San Joaquin Valley Orcutt grass are on the east side of the San Joaquin Valley (USFWS 2005a).

CRITICAL HABITAT: Critical habitat for San Joaquin Valley Orcutt grass was designated in 2006 (71 FR 7118 7316). The BSA does not contain federal designated critical habitat for San Joaquin Valley Orcutt grass. The nearest critical habitat occurs approximately 97.5 miles southwest.

KNOWN RECORDS: There is 1 CNDDDB record of San Joaquin Valley Orcutt grass within the 9-quad area surrounding the BSA. The record (Occurrence #63) is from 2011, approximately 5.4 miles northeast of the BSA. Thousands of plants were observed in an alkali playa pool on Solano loam, and in adjacent vernal pools and swales just east of Travis Air Force Base near Muzzy Ranch mitigation bank.

HABITAT PRESENT IN THE BSA: The deeper seasonal wetlands in the southern portion of the BSA provide potential habitat for San Joaquin Valley Orcutt grass.

DISCUSSION: San Joaquin Valley Orcutt grass was not observed in the BSA during the protocol botanical survey conducted during the evident and identifiable period. Seasonal wetlands in the central and northern portion of the BSA do not inundate at sufficient depths or durations to support this species.

Bearded popcorn flower (*Plagiobothrys hystriculus*)

HABITAT AND BIOLOGY: Bearded popcorn flower is an annual herb found in mesic valley and foothill grassland and vernal pools and swales from 0 to 900 feet. It blooms April through May (CNPS 2021a); March through May (Jepson eFlora 2021).

RANGE: This species is endemic to California. Bearded popcorn flower is known only from Solano County, primarily in the Montezuma Hills (CNPS 2021a).

KNOWN RECORDS: There are 12 CNDDDB records of bearded popcorn flower within the 9-quad area surrounding the BSA. The closest (Occurrence #12) is from 2006, and is mapped

overlapping the entire BSA, ranging from the south of Travis Air Force Base to north of Hammond Island. The record is for bearded popcorn flower observed in vernal swales and pools associated with *Lolium multiflorum*, *Erygium aristulatum*, *Achyrrachaena mollis*, *Juncus bufonius*, *Lythrum Hyssopifolium*, *Cicendia quadrangularis*, *Ranunculus muricatus*, and *Hordeum marinum*. Location information for the record is suppressed by the CNDDDB, but the record does state that the plants occur within a gas pipeline right-of-way with cattle grazing. Information in the herbarium specimen sources for Occurrence #12 indicate the plants occur at a specific location over 5 miles southeast of the BSA. No known bearded popcorn plant populations occur in the BSA or within 5 miles.

HABITAT PRESENT IN THE BSA: The valley floor grassland, alkali meadow, and seasonal wetlands provide potential habitat for bearded popcorn flower.

DISCUSSION: Bearded popcorn flower was not observed in the BSA during the protocol botanical survey conducted during the evident and identifiable period.

California alkali grass (*Puccinellia simplex*)

HABITAT AND BIOLOGY: California alkali grass is an annual herb found in alkaline, vernal mesic sinks, flats, and lake margins within chenopod scrub, meadows and seeps, valley and foothill grassland, and vernal pools from 7 to 3,051 feet. It blooms March through May (Jepson eFlora 2021; CNPS 2021a).

RANGE: California alkali grass is known from Alameda, Butte, Contra Costa, Colusa, Fresno, Glenn, Kern, Lake, Los Angeles, Madera, Merced, Napa, San Bernardino, Santa Clara, Santa Cruz, San Luis Obispo, Solano, Stanislaus, Tulare, and Yolo counties. It is presumed extirpated from Kings County (CNPS 2021a).

KNOWN RECORDS: There are 3 CNDDDB records of California alkali grass within the 9-quad area surrounding the BSA. The closest (Occurrence #60) is from 1938, approximately 2.7 miles west of the BSA. The exact location is unknown.

HABITAT PRESENT IN THE BSA: Portions of the valley floor grassland with elevated alkalinity, alkali meadow, and seasonal wetlands provide potential habitat for California alkali grass.

DISCUSSION: California alkali grass was not observed in the BSA during the protocol botanical survey conducted during the evident and identifiable period.

Long-styled sand-spurrey (*Spergularia macrotheca* var. *longistyla*)

HABITAT AND BIOLOGY: Long-styled sand-spurrey is a perennial herb found in alkaline marshes, mud flats, meadows, and hot springs below 650 feet. It blooms in spring (Jepson 2020); February through May (CNPS 2021a).

RANGE: This species is endemic to California. Long-styled sand-spurrey is known from Alameda, Contra Costa, Napa, and Solano counties (CNPS 2021a).

KNOWN RECORDS: There are 3 CNDDDB records of long-styled sand-spurrey within the 9-quad area surrounding the BSA. The closest (Occurrence #18) is from 1953, approximately 2.7 miles west of the BSA. The record is based on long-styled sand-spurrey that was observed in an alkaline, open field in Suisun City. The exact location is unknown.

HABITAT PRESENT IN THE BSA: The seasonal wetland, alkali meadow, and coastal brackish marsh provide potential habitat for long-styled sand-spurrey.

DISCUSSION: Long-styled sand-spurrey was not observed in the BSA during the protocol botanical survey conducted during the evident and identifiable period. Closely related sticky sand-spurrey (*Spergularia macrotheca* var. *leucantha*; no special-status) was observed in and among the hyperalkaline/hypersaline hummocky seasonal wetlands in the southernmost portion of the BSA.

Slender-leaved pondweed (*Stuckenia filiformis* ssp. *alpina*)

HABITAT AND BIOLOGY: Slender-leaved pondweed is a perennial rhizomatous aquatic herb found in assorted shallow freshwater marshes and swamps from 950 to 7,100 feet. It blooms May through July (CNPS 2021a; Jepson eFlora 2021).

RANGE: Slender-leaved pondweed is known from the Klamath Ranges, central high Sierra Nevada, Great Valley, Central Coast, Bay Area, and Great Basin.

KNOWN RECORDS: There is 1 CNDDDB record of slender-leaved pondweed within the 9-quad area surrounding the BSA. The record (Occurrence #17) is from 1981, approximately 3.6 miles northwest of the BSA. The record is for slender-leaved pondweed that was observed around the pond near Fairfield City Hall.

HABITAT PRESENT IN THE BSA: The freshwater marsh in DD-01 provides potential habitat for slender-leaved pondweed.

DISCUSSION: Slender-leaved pondweed was not observed in the BSA during the protocol botanical survey conducted during the evident and identifiable period.

Suisun Marsh aster (*Symphotrichum lentum*; syn. *Aster lentus*)

HABITAT AND BIOLOGY: Suisun Marsh aster is a perennial rhizomatous herb found in brackish and freshwater marshes and swamps from 0 to 10 feet. It blooms April through November (CNPS 2021a); May through November (Jepson eFlora 2021).

RANGE: This species is endemic to California. Suisun Marsh aster is known from Contra Costa, Napa, Sacramento, San Joaquin, Solano, and Yolo counties (CNPS 2021a).

KNOWN RECORDS: There are 71 CNDDDB records of Suisun Marsh aster within the 9-quad area surrounding the BSA. The closest (Occurrence #9) is from 2016, approximately 0.6 mile southwest of the BSA. The record is for numerous Suisun Marsh aster colonies observed in the brackish slough and riverbanks affected by tidal fluctuations along Hill, Peytonia, Boynton and Sheldrake sloughs near south Suisun City. The Suisun Marsh aster

was associated with *Scirpus*, *Typha*, *Juncus*, *Schoenoplectus acutus* var. *occidentalis*, *Baccharis*, *Pluchea odorata*, and *Lathyrus jepsonii* var. *jepsonii*.

HABITAT PRESENT IN THE BSA: The freshwater marsh in DD-01 and the coastal brackish marsh provide potential habitat for Suisun marsh aster.

DISCUSSION: Suisun Marsh aster was not observed in the BSA during the protocol botanical survey conducted during the evident and identifiable period.

Saline clover (*Trifolium hydrophilum*)

HABITAT AND BIOLOGY: Saline clover is an annual herb found in salt marshes and swamps, mesic or alkaline valley and foothill grasslands, and vernal pools from sea level to 985 feet. It blooms April through June (CNPS 2021a; Jepson eFlora 2021).

RANGE: This species is endemic to California. Saline clover is known from Alameda, Contra Costa, Colusa, Lake, Monterey, Napa, Sacramento, San Benito, Santa Clara, Santa Cruz, San Joaquin, San Luis Obispo, San Mateo, Solano, Sonoma, and Yolo counties (CNPS 2021a).

KNOWN RECORDS: There are 8 CNDDDB records of saline clover within the 9-quad area surrounding the BSA. The closest (Occurrence #10) is from 2007, approximately 2.8 miles north of the BSA. The record is for less than 100 plants observed in scattered pools and swales with alkaline soil substrates between the railroad tracks to the south and Cement Hill Road to the north. The saline clover was associated with *Poa annua*, *Lepidium latipes* var. *latipes*, *Hordeum depressum*, *Bromus hordeaceus*, *Trifolium depauperatum*, *T. truncatum*, and *Lasthenia conjegens*.

HABITAT PRESENT IN THE BSA: The valley floor grassland, alkali meadow, and seasonal wetlands provide potential habitat for saline clover.

DISCUSSION: An estimated 885 saline clover plants were mapped within the BSA in April 2021 (Figure 5; Appendix D, photos 29 and 30). The plants were observed only at the southeast corner of the BSA along the margins of seasonal wetlands and brackish marsh. The saline clover plants were in flower and fruit. The plants were growing with Italian rye grass, Mediterranean barley, and dwarf sack clover (*Trifolium depauperatum* var. *depauperatum*).

Solano grass (*Tuctoria mucronata*)

HABITAT AND BIOLOGY: Solano grass is an annual herb found in mesic soils and vernal pools in valley and foothill grassland from 16 to 32 feet. It blooms from April through August (CNPS 2021a; Jepson eFlora 2021). Members of the Orcuttieae tribe inhabit large vernal pools or playas with inundation lasting until May or June, in areas of the pools where other plants are almost entirely absent. Solano grass is known only from alkaline soils of the Pescadero series (USFWS 2005).

RANGE: This species is endemic to California. Solano grass is known from only three occurrences: one at Olcott Lake at Jepson Prairie Preserve, one nearby on private land, and one south of Davis on federal land (CNPS 2021a).

CRITICAL HABITAT: Critical habitat for Solano grass was designated in 2006 (71 FR 7118 7316). The BSA does not contain federal designated critical habitat for Solano grass. The nearest critical habitat occurs approximately 23.5 miles northeast.

KNOWN RECORDS: There are 2 CNDDDB records of Solano grass within the 9-quad area surrounding the BSA. The closest (Occurrence #2) is from 2010, approximately 6.1 miles northeast of the BSA. The record is for approximately 64 plants observed in large saline-alkaline playa pools in annual grasslands, in association with *Malvella leprosa*, *Frankenia salina*, *Cressa truxillensis*, *Eryngium aristulatum*, *Distichlis spicata*, and *Neostapfia colusana*.

HABITAT PRESENT IN THE BSA: The deeper seasonal wetlands in the southern portion of the BSA provide potential habitat for Solano grass.

DISCUSSION: Solano grass was not observed in the BSA during the protocol botanical survey conducted during the evident and identifiable period. Seasonal wetlands in the central and northern portion of the BSA do not inundate at sufficient depths or durations to support this species.

E. Evaluation of Sensitive Natural Communities

Waters and Wetlands

HABITAT PRESENT IN THE BSA: This report incorporates the results of a field verified Aquatic Resource Delineation Report (ARDR) prepared to U.S. Army Corps of Engineers minimum standards (SWCA 2021). The wetlands and waters are incorporated in Table 4, summarized in Table 5, and shown on Figure 4. Within the BSA, there is a total of approximately 19.41 acres of waters and wetlands consisting of approximately 14.57 acres of seasonal wetland (plus an additional 0.65 acre of seasonal wetland within Drainage Ditch DD-02), 0.74 acre of freshwater marsh (found only within Drainage Ditch DD-01), 3.36 acres of coastal brackish marsh, and 0.09 acre of roadside ditches.

DISCUSSION: The approximately 19.41 acres of wetlands and waters in the BSA are potential Clean Water Act § 404 jurisdictional features (SWCA 2021) and potential Waters of the State under the Porter-Cologne Water Quality Control Act and the State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State (SWRCB 2021). The drainage ditches and some of the wetlands are likely regulated under to the CDFW Lake and Streambed Agreement Program (FGC § 1600). With the possible exception of the roadside ditches, placement of fill in these features is expected to require a permit from the U.S. Army Corps of Engineers and a Water Quality Certification from the Regional Water Quality Control Board. Alteration of the flow, bed, bank, or riparian vegetation associated with the channel features would require a CDFW Lake and Streambed Alteration Agreement.

Sensitive Vegetation Types

HABITAT PRESENT IN THE BSA: In addition to the approximately 19.41 acres of wetlands and waters described above, there are approximately 16.91 acres of sensitive (Rank S2) non-wetland alkali meadow in the BSA, as shown on Figure 4. Approximately 43.08 acres of sensitive *Centromadia parryi* Herbaceous Alliance (Rank S2) occurs in the BSA, primarily in the areas mapped as valley floor grassland (see pappose tarplant polygons on Figure 5). Portions of the alkali meadow and seasonal wetlands located within alkali meadow in the southern portion of the BSA may contain *Cressa truxillensis* – *Distichlis spicata* Herbaceous Alliance (Rank S2) and *Frankenia salina* Herbaceous Alliance (Rank S3). Woody riparian vegetation present in the BSA consists of 1 white alder tree along DD-01 (northern portion), 2 ash trees along DD-01 (southern portion), and several Lombardy poplar trees along DD-02 (southern portion adjacent to SR 12). The riparian trees are shown in the photographs in Appendix D.

DISCUSSION: Alkali meadow, *Centromadia parryi* Herbaceous Alliance, *Cressa truxillensis* – *Distichlis spicata* Herbaceous Alliance, and *Frankenia salina* Herbaceous Alliance have state rarity rankings of S2 or S3 and are of conservation concern because they are of limited distribution and vulnerable or imperiled statewide. CDFW recommends that impacts to such vegetation be considered under CEQA. Impacts to the ditches and the riparian trees along the ditches are regulated under the CDFW Lake and Streambed Alteration Agreement program.

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Personal Communications

Marty, Jaymee, PhD. 29 June 2021. Provided preliminary 2017 trapping survey results for California tiger salamander on and around Travis Air Force Base.

Baldwin, Bruce, PhD. 29 November 2020. Confirmed identity of pappose tarplant (*Centromadia parryi* ssp. *parryi*) collected from the Suisun Logistics Center site in October and November 2020 based on photographs of plants provided via email.

PREPARERS

Jeffery Little, Director., Director with over 28 years of experience working with environmental review, permitting, biological, and cultural issues. Mr. Little evaluates environmental and regulatory constraints to generate effective approaches for project permits and approvals. He prepares and manages CEQA/ NEPA documents and technical studies. He develops project design recommendations to achieve regulatory compliance with local, state, and federal environmental laws and regulations.

Responsibilities: Director of the Sacramento Office, QA/QC

Michael Bower, M.S., Ecology, University of California, Davis, CA. Over 13 years of experience as a biologist/ botanist with SWCA (formerly Sycamore Environmental). Mr. Bower serves as lead field biologist and technical report writer. He conducts wetland delineations and surveys for special-status plants and wildlife. He prepares reports used in CEQA/NEPA that quantify resources, identify impacts, and recommend mitigation measures. He prepares restoration, weed management, and monitoring plans. He is a certified an ESA certified Ecologist and SWS Professional Wetland Scientist (#2230).

Responsibilities: Senior technical lead, fieldwork, plant identification, report preparation

R. John Little, Ph.D., Botany, Claremont Graduate School, Claremont, CA. Over 40 years of experience managing and conducting environmental projects involving impact assessment and preparation of numerous NEPA/CEQA compliance documents, Biological Assessments, and Caltrans Natural Environmental Studies. Experience includes conducting special-status plant and wildlife species surveys, jurisdictional wetland delineations, general biological surveys, permitting and biological report preparation. Dr. Little is a trained wetland delineator and an ESA certified Senior Ecologist.

Responsibilities: Fieldwork, plant identification

Kevin Derby, B.A., Environmental Conservation, University of Colorado, Boulder, CO. Mr. Derby has more than 27 years of professional experience in multi-agency regulatory permitting and compliance, ecological restoration, natural resource assessments, special-status flora and fauna species surveys, mitigation design, and construction compliance monitoring. Mr. Derby's specific duties include but are not limited to, managing large wetland delineation projects, CWA §404 and §401 permitting, DFG Code §1603 permitting, wetland assessments, restoration success monitoring, project alternatives analyses, biological assessments, wetland and biology sections of environmental planning documents, and construction monitoring near sensitive biological resources. Kevin is a certified CRAM practitioner and SWS Professional Wetland Scientist (#3003).

Responsibilities: Report review

Ted Hermansen, M.S., Education, California State University, East Bay; B.S., Biology and Environmental Studies, University of California, Santa Cruz. Mr. Hermansen has 19 years of professional biological experience. As an environmental consultant, he has focused on coordinating the implementation of large-scale projects. His work has included: staffing/training, supporting environmental review processes, permitting, wildlife and habitat surveys, monitoring, and reporting. Mr. Hermansen has experience in transportation, flood protection, development, and energy projects throughout northern California.

Responsibilities: Fieldwork

Monica E. Coll, B.A., Environmental Science and Conservation Biology, Clark University, Worcester, MA. Two years of experience as a biologist. Her background is in conservation biology, and she has accumulated a range of knowledge including project management skills and wildlife survey experience. Ms. Coll serves as both field biologist and technical report writer. She conducts construction monitoring and wildlife surveys, writes biological resource evaluations, and assists with plant surveys and wetland delineations.

Responsibilities: Fieldwork, report preparation

Alex V. Jamal, B.S., Wildlife Conservation and Management, Humboldt State University, Arcata, CA. Two years of experience as a biologist. He serves as both field biologist and technical report writer. He conducts plant and wildlife surveys, performs preconstruction and construction monitoring, and prepares environmental documents such as, biological resource reports and preconstruction reports. His background is in wildlife biology and biological surveys and has accumulated a range of knowledge and skills in wildlife surveys.

Responsibilities: Fieldwork

Charlotte Soergel, B.A., Environmental Studies, University of California, Santa Barbara, CA. Ms. Soergel has 4 years of experience conducting restoration implementation and habitat monitoring in sensitive communities including riparian corridors, vernal pools, controlled burn areas, wetlands, and coastal bluffs. Her areas of expertise include special-status flora and fauna surveys, wetland delineations, vegetation surveys, and invasive species removal, construction monitoring, erosion and sediment control, and restoration implementation, maintenance, and monitoring. Ms. Soergel assists with the preparation of environmental documents including CEQA IS/MNDs, jurisdictional wetland delineations, biological assessments, and natural resource management plans. She has experience with special-status species including California red-legged frog, foothill yellow-legged frog, western pond turtle, California tiger salamander, burrowing owl, and San Francisco garter snake.

Responsibilities: Fieldwork

Aramis Respoll, GIS Analyst/ CAD Operator. Over 25 years of experience in drafting and spatial analysis using AutoCAD map and ArcGIS for public and private projects. He prepares figures for biological and permitting documents such as project location maps, aerial photograph exhibits, biological resource maps, wetlands/waters delineation maps, project impact maps, and other supporting graphics. Mr. Respoll provides geospatial analysis and support for projects involving geodesy, hydrology, watershed studies, project impact and mitigation analyses, listed species, and designated critical habitat. Primary experience evolved from conventional surveying and civil engineering practices to advanced GPS and GIS based technology.

Responsibilities: Figure preparation and spatial analysis

APPENDIX A.

Database Queries



Selected Elements by Common Name
California Department of Fish and Wildlife
California Natural Diversity Database



Query Criteria: Quad (Denverton (3812128) OR Fairfield North (3812231) OR Fairfield South (3812221) OR Elmira (3812138) OR Dozier (3812137) OR Birds Landing (3812127) OR Antioch North (3812117) OR Honker Bay (3812118) OR Vine Hill (3812211))

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
adobe-lily <i>Fritillaria pluriflora</i>	PMLIL0V0F0	None	None	G2G3	S2S3	1B.2
alkali milk-vetch <i>Astragalus tener</i> var. <i>tener</i>	PDFAB0F8R1	None	None	G2T1	S1	1B.2
alkali-sink goldfields <i>Lasthenia chrysantha</i>	PDAST5L030	None	None	G2	S2	1B.1
American badger <i>Taxidea taxus</i>	AMAJF04010	None	None	G5	S3	SSC
Antioch andrenid bee <i>Perdita scitula antiochensis</i>	IIHYM01031	None	None	G1T1	S1	
Antioch Dunes anthicid beetle <i>Anthicus antiochensis</i>	IICOL49020	None	None	G1	S1	
Antioch Dunes buckwheat <i>Eriogonum nudum</i> var. <i>psychicola</i>	PDPGN0849Q	None	None	G5T1	S1	1B.1
Antioch Dunes evening-primrose <i>Oenothera deltooides</i> ssp. <i>howellii</i>	PDONA0C0B4	Endangered	Endangered	G5T1	S1	1B.1
Antioch Dunes halcitid bee <i>Sphecodogastra antiochensis</i>	IIHYM78010	None	None	G1	S1	
Antioch efferian robberfly <i>Efferia antiochi</i>	IIDIP07010	None	None	G1G2	S1S2	
Antioch multilid wasp <i>Myrmosula pacifica</i>	IIHYM15010	None	None	GH	SH	
Antioch specid wasp <i>Philanthus nasalis</i>	IIHYM20010	None	None	G1	S1	
Baker's navarretia <i>Navarretia leucocephala</i> ssp. <i>bakeri</i>	PDPLM0C0E1	None	None	G4T2	S2	1B.1
bearded popcornflower <i>Plagiobothrys hystriculus</i>	PDBOR0V0H0	None	None	G2	S2	1B.1
big free-tailed bat <i>Nyctinomops macrotis</i>	AMACD04020	None	None	G5	S3	SSC
big tarplant <i>Blepharizonia plumosa</i>	PDAST1C011	None	None	G1G2	S1S2	1B.1
black-crowned night heron <i>Nycticorax nycticorax</i>	ABNGA11010	None	None	G5	S4	
Blennosperma vernal pool andrenid bee <i>Andrena blennospermatis</i>	IIHYM35030	None	None	G2	S2	
Boggs Lake hedge-hyssop <i>Gratiola heterosepala</i>	PDSCR0R060	None	Endangered	G2	S2	1B.2



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California Department of Fish and Wildlife
California Natural Diversity Database



Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Bolander's water-hemlock <i>Cicuta maculata</i> var. <i>bolanderi</i>	PDAP10M051	None	None	G5T4T5	S2?	2B.1
Brewer's western flax <i>Hesperolinon breweri</i>	PDLIN01030	None	None	G2	S2	1B.2
Bridges' coast range shoulderband <i>Helminthoglypta nickliniana bridgesi</i>	IMGASC2362	None	None	G3T1	S1S2	
brittlescale <i>Atriplex depressa</i>	PDCHE042L0	None	None	G2	S2	1B.2
burrowing owl <i>Athene cunicularia</i>	ABNSB10010	None	None	G4	S3	SSC
California alkali grass <i>Puccinellia simplex</i>	PMPOA53110	None	None	G3	S2	1B.2
California black rail <i>Laterallus jamaicensis coturniculus</i>	ABNME03041	None	Threatened	G3G4T1	S1	FP
California glossy snake <i>Arizona elegans occidentalis</i>	ARADB01017	None	None	G5T2	S2	SSC
California least tern <i>Sternula antillarum browni</i>	ABNNM08103	Endangered	Endangered	G4T2T3Q	S2	FP
California linderiella <i>Linderiella occidentalis</i>	ICBRA06010	None	None	G2G3	S2S3	
California red-legged frog <i>Rana draytonii</i>	AAABH01022	Threatened	None	G2G3	S2S3	SSC
California Ridgway's rail <i>Rallus obsoletus obsoletus</i>	ABNME05011	Endangered	Endangered	G3T1	S1	FP
California tiger salamander - central California DPS <i>Ambystoma californiense</i> pop. 1	AAAAA01181	Threatened	Threatened	G2G3	S3	WL
callippe silverspot butterfly <i>Speyeria callippe callippe</i>	IILEPJ6091	Endangered	None	G5T1	S1	
Carquinez goldenbush <i>Isocoma arguta</i>	PDAST57050	None	None	G1	S1	1B.1
Coastal and Valley Freshwater Marsh <i>Coastal and Valley Freshwater Marsh</i>	CTT52410CA	None	None	G3	S2.1	
Coastal Brackish Marsh <i>Coastal Brackish Marsh</i>	CTT52200CA	None	None	G2	S2.1	
Colusa grass <i>Neostapfia colusana</i>	PMPOA4C010	Threatened	Endangered	G1	S1	1B.1
Congdon's tarplant <i>Centromadia parryi</i> ssp. <i>congdonii</i>	PDAST4R0P1	None	None	G3T1T2	S1S2	1B.1
Conservancy fairy shrimp <i>Branchinecta conservatio</i>	ICBRA03010	Endangered	None	G2	S2	
Contra Costa goldfields <i>Lasthenia conjugens</i>	PDAST5L040	Endangered	None	G1	S1	1B.1



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Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Contra Costa wallflower <i>Erysimum capitatum</i> var. <i>angustatum</i>	PDBRA16052	Endangered	Endangered	G5T1	S1	1B.1
Coulter's goldfields <i>Lasthenia glabrata</i> ssp. <i>coulteri</i>	PDAST5L0A1	None	None	G4T2	S2	1B.1
Crampton's tuctoria or Solano grass <i>Tuctoria mucronata</i>	PMPOA6N020	Endangered	Endangered	G1	S1	1B.1
Crotch bumble bee <i>Bombus crotchii</i>	IIHYM24480	None	None	G3G4	S1S2	
Delta green ground beetle <i>Elaphrus viridis</i>	IICOL36010	Threatened	None	G1	S1	
Delta mudwort <i>Limosella australis</i>	PDSCR10030	None	None	G4G5	S2	2B.1
Delta smelt <i>Hypomesus transpacificus</i>	AFCHB01040	Threatened	Endangered	G1	S1	
Delta tule pea <i>Lathyrus jepsonii</i> var. <i>jepsonii</i>	PDFAB250D2	None	None	G5T2	S2	1B.2
diamond-petaled California poppy <i>Eschscholzia rhombipetala</i>	PDPAP0A0D0	None	None	G1	S1	1B.1
double-crested cormorant <i>Phalacrocorax auritus</i>	ABNFD01020	None	None	G5	S4	WL
dwarf downingia <i>Downingia pusilla</i>	PDCAM060C0	None	None	GU	S2	2B.2
Ferris' milk-vetch <i>Astragalus tener</i> var. <i>ferrisiae</i>	PDFAB0F8R3	None	None	G2T1	S1	1B.1
ferruginous hawk <i>Buteo regalis</i>	ABNKC19120	None	None	G4	S3S4	WL
foothill yellow-legged frog <i>Rana boylei</i>	AAABH01050	None	Endangered	G3	S3	SSC
fragrant fritillary <i>Fritillaria liliacea</i>	PMLIL0V0C0	None	None	G2	S2	1B.2
giant gartersnake <i>Thamnophis gigas</i>	ARADB36150	Threatened	Threatened	G2	S2	
golden eagle <i>Aquila chrysaetos</i>	ABNKC22010	None	None	G5	S3	FP
grasshopper sparrow <i>Ammodramus savannarum</i>	ABPBXA0020	None	None	G5	S3	SSC
great egret <i>Ardea alba</i>	ABNGA04040	None	None	G5	S4	
hairy water flea <i>Dumontia oregonensis</i>	ICBRA23010	None	None	G1G3	S1	
heartscale <i>Atriplex cordulata</i> var. <i>cordulata</i>	PDCHE040B0	None	None	G3T2	S2	1B.2



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Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Heckard's pepper-grass <i>Lepidium latipes var. heckardii</i>	PDBRA1M0K1	None	None	G4T1	S1	1B.2
hispid salty bird's-beak <i>Chloropyron molle ssp. hispidum</i>	PDSCR0J0D1	None	None	G2T1	S1	1B.1
hoary bat <i>Lasiurus cinereus</i>	AMACC05030	None	None	G3G4	S4	
Hoover's cryptantha <i>Cryptantha hooveri</i>	PDBOR0A190	None	None	GH	SH	1A
Hurd's metapogon robberfly <i>Metapogon hurdi</i>	IIDIP08010	None	None	G1G2	S1S2	
Jepson's coyote-thistle <i>Eryngium jepsonii</i>	PDAP10Z130	None	None	G2	S2	1B.2
Keck's checkerbloom <i>Sidalcea keckii</i>	PDMAL110D0	Endangered	None	G2	S2	1B.1
Lange's metalmark butterfly <i>Apodemia mormo langei</i>	IILEPH7012	Endangered	None	G5T1	S1	
legenere <i>Legenere limosa</i>	PDCAM0C010	None	None	G2	S2	1B.1
longfin smelt <i>Spirinchus thaleichthys</i>	AFCHB03010	Candidate	Threatened	G5	S1	
long-styled sand-spurrey <i>Spergularia macrotheca var. longistyla</i>	PDCAR0W062	None	None	G5T2	S2	1B.2
Lyngbye's sedge <i>Carex lyngbyei</i>	PMCYP037Y0	None	None	G5	S3	2B.2
marsh microseris <i>Microseris paludosa</i>	PDAST6E0D0	None	None	G2	S2	1B.2
Mason's lilaepsis <i>Lilaepsis masonii</i>	PDAP119030	None	Rare	G2	S2	1B.1
Middlekauff's shieldback katydid <i>Idiostatus middlekauffi</i>	IORT31010	None	None	G1G2	S1	
midvalley fairy shrimp <i>Branchinecta mesovallensis</i>	ICBRA03150	None	None	G2	S2S3	
monarch - California overwintering population <i>Danaus plexippus pop. 1</i>	IILEPP2012	Candidate	None	G4T2T3	S2S3	
mountain plover <i>Charadrius montanus</i>	ABNNB03100	None	None	G3	S2S3	SSC
Mt. Diablo buckwheat <i>Eriogonum truncatum</i>	PDPGN085Z0	None	None	G1	S1	1B.1
Northern California legless lizard <i>Anniella pulchra</i>	ARACC01020	None	None	G3	S3	SSC
Northern Claypan Vernal Pool <i>Northern Claypan Vernal Pool</i>	CTT44120CA	None	None	G1	S1.1	



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Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
northern harrier <i>Circus hudsonius</i>	ABNKC11011	None	None	G5	S3	SSC
northern slender pondweed <i>Stuckenia filiformis ssp. alpina</i>	PMPOT03091	None	None	G5T5	S2S3	2B.2
oval-leaved viburnum <i>Viburnum ellipticum</i>	PDCPR07080	None	None	G4G5	S3?	2B.3
pappose tarplant <i>Centromadia parryi ssp. parryi</i>	PDAST4R0P2	None	None	G3T2	S2	1B.2
recurved larkspur <i>Delphinium recurvatum</i>	PDRAN0B1J0	None	None	G2?	S2?	1B.2
redheaded sphecid wasp <i>Eucerceris ruficeps</i>	IIHYM18010	None	None	G1G3	S1S2	
Ricksecker's water scavenger beetle <i>Hydrochara rickseckeri</i>	IICOL5V010	None	None	G2?	S2?	
Sacramento perch <i>Archoplites interruptus</i>	AFCQB07010	None	None	G2G3	S1	SSC
Sacramento splittail <i>Pogonichthys macrolepidotus</i>	AFCJB34020	None	None	GNR	S3	SSC
saline clover <i>Trifolium hydrophilum</i>	PDFAB400R5	None	None	G2	S2	1B.2
saltmarsh common yellowthroat <i>Geothlypis trichas sinuosa</i>	ABPBX1201A	None	None	G5T3	S3	SSC
salt-marsh harvest mouse <i>Reithrodontomys raviventris</i>	AMAFF02040	Endangered	Endangered	G1G2	S1S2	FP
San Joaquin dune beetle <i>Coelus gracilis</i>	IICOL4A020	None	None	G1	S1	
San Joaquin pocket mouse <i>Perognathus inornatus</i>	AMAFD01060	None	None	G2G3	S2S3	
San Joaquin spearscale <i>Extriplex joaquinana</i>	PDCHE041F3	None	None	G2	S2	1B.2
San Joaquin Valley Orcutt grass <i>Orcuttia inaequalis</i>	PMPOA4G060	Threatened	Endangered	G1	S1	1B.1
short-eared owl <i>Asio flammeus</i>	ABNSB13040	None	None	G5	S3	SSC
snowy egret <i>Egretta thula</i>	ABNGA06030	None	None	G5	S4	
soft salty bird's-beak <i>Chloropyron molle ssp. molle</i>	PDSCR0J0D2	Endangered	Rare	G2T1	S1	1B.2
song sparrow ("Modesto" population) <i>Melospiza melodia</i>	ABPBXA3010	None	None	G5	S3?	SSC
Stabilized Interior Dunes <i>Stabilized Interior Dunes</i>	CTT23100CA	None	None	G1	S1.1	



Selected Elements by Common Name
California Department of Fish and Wildlife
California Natural Diversity Database



Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
steelhead - Central Valley DPS <i>Oncorhynchus mykiss irideus pop. 11</i>	AFCHA0209K	Threatened	None	G5T2Q	S2	
Suisun Marsh aster <i>Symphotrichum lentum</i>	PDASTE8470	None	None	G2	S2	1B.2
Suisun shrew <i>Sorex ornatus sinuosus</i>	AMABA01103	None	None	G5T1T2Q	S1S2	SSC
Suisun song sparrow <i>Melospiza melodia maxillaris</i>	ABPBXA301K	None	None	G5T3	S3	SSC
Suisun thistle <i>Cirsium hydrophilum var. hydrophilum</i>	PDAST2E1G1	Endangered	None	G2T1	S1	1B.1
Swainson's hawk <i>Buteo swainsoni</i>	ABNKC19070	None	Threatened	G5	S3	
Townsend's big-eared bat <i>Corynorhinus townsendii</i>	AMACC08010	None	None	G4	S2	SSC
tricolored blackbird <i>Agelaius tricolor</i>	ABPBXB0020	None	Threatened	G1G2	S1S2	SSC
two-fork clover <i>Trifolium amoenum</i>	PDFAB40040	Endangered	None	G1	S1	1B.1
valley elderberry longhorn beetle <i>Desmocerus californicus dimorphus</i>	IICOL48011	Threatened	None	G3T2	S3	
Valley Needlegrass Grassland <i>Valley Needlegrass Grassland</i>	CTT42110CA	None	None	G3	S3.1	
vernal pool fairy shrimp <i>Branchinecta lynchi</i>	ICBRA03030	Threatened	None	G3	S3	
vernal pool smallscale <i>Atriplex persistens</i>	PDCHE042P0	None	None	G2	S2	1B.2
vernal pool tadpole shrimp <i>Lepidurus packardii</i>	ICBRA10010	Endangered	None	G4	S3S4	
western bumble bee <i>Bombus occidentalis</i>	IIHYM24250	None	None	G2G3	S1	
western pond turtle <i>Emys marmorata</i>	ARAAD02030	None	None	G3G4	S3	SSC
western red bat <i>Lasiurus blossevillii</i>	AMACC05060	None	None	G4	S3	SSC
western ridged mussel <i>Gonidea angulata</i>	IMBIV19010	None	None	G3	S1S2	
white-tailed kite <i>Elanus leucurus</i>	ABNKC06010	None	None	G5	S3S4	FP
Wilbur Springs shorebug <i>Saldula usingeri</i>	IIHEM07010	None	None	G1	S1	
woolly rose-mallow <i>Hibiscus lasiocarpus var. occidentalis</i>	PDMAL0H0R3	None	None	G5T3	S3	1B.2



Selected Elements by Common Name
California Department of Fish and Wildlife
California Natural Diversity Database



Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
yellow rail <i>Coturnicops noveboracensis</i>	ABNME01010	None	None	G4	S1S2	SSC

Record Count: 125

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Solano County, California



Local office

Sacramento Fish And Wildlife Office

☎ (916) 414-6600

📅 (916) 414-6713

Federal Building
2800 Cottage Way, Room W-2605
Sacramento, CA 95825-1846

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species¹ and their critical habitats are managed by the [Ecological Services Program](#) of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries²).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact [NOAA Fisheries](#) for [species under their jurisdiction](#).

1. Species listed under the [Endangered Species Act](#) are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the [listing status page](#) for more information. IPaC only shows species that are regulated by USFWS (see FAQ).
2. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME

STATUS

Salt Marsh Harvest Mouse *Reithrodontomys raviventris* Endangered
Wherever found
No critical habitat has been designated for this species.
<https://ecos.fws.gov/ecp/species/613>

Birds

NAME	STATUS
California Clapper Rail <i>Rallus longirostris obsoletus</i> Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/4240	Endangered
California Least Tern <i>Sterna antillarum browni</i> Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/8104	Endangered

Reptiles

NAME	STATUS
Giant Garter Snake <i>Thamnophis gigas</i> Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/4482	Threatened

Amphibians

NAME	STATUS
California Red-legged Frog <i>Rana draytonii</i> Wherever found There is final critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/2891	Threatened
California Tiger Salamander <i>Ambystoma californiense</i> There is final critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/2076	Threatened

Fishes

NAME	STATUS
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Delta Smelt *Hypomesus transpacificus* Threatened
 Wherever found
 There is **final** critical habitat for this species. The location of the critical habitat is not available.
<https://ecos.fws.gov/ecp/species/321>

Insects

NAME	STATUS
Delta Green Ground Beetle <i>Elaphrus viridis</i> Wherever found There is final critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/2319	Threatened
Monarch Butterfly <i>Danaus plexippus</i> Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9743	Candidate
Valley Elderberry Longhorn Beetle <i>Desmocerus californicus dimorphus</i> Wherever found There is final critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/7850	Threatened

Crustaceans

NAME	STATUS
Conservancy Fairy Shrimp <i>Branchinecta conservatio</i> Wherever found There is final critical habitat for this species. Your location overlaps the critical habitat. https://ecos.fws.gov/ecp/species/8246	Endangered
Vernal Pool Fairy Shrimp <i>Branchinecta lynchi</i> Wherever found There is final critical habitat for this species. Your location overlaps the critical habitat. https://ecos.fws.gov/ecp/species/498	Threatened
Vernal Pool Tadpole Shrimp <i>Lepidurus packardii</i> Wherever found There is final critical habitat for this species. Your location overlaps the critical habitat. https://ecos.fws.gov/ecp/species/2246	Endangered

Flowering Plants

NAME	STATUS
Contra Costa Goldfields <i>Lasthenia conjugens</i> Wherever found There is final critical habitat for this species. Your location overlaps the critical habitat. https://ecos.fws.gov/ecp/species/7058	Endangered
Keck's Checker-mallow <i>Sidalcea keckii</i> Wherever found There is final critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/5704	Endangered
Soft Bird's-beak <i>Cordylanthus mollis</i> ssp. <i>mollis</i> Wherever found There is final critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/8541	Endangered
Suisun Thistle <i>Cirsium hydrophilum</i> var. <i>hydrophilum</i> Wherever found There is final critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/2369	Endangered

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

This location overlaps the critical habitat for the following species:

NAME	TYPE
Conservancy Fairy Shrimp <i>Branchinecta conservatio</i> https://ecos.fws.gov/ecp/species/8246#crithab	Final
Contra Costa Goldfields <i>Lasthenia conjugens</i> https://ecos.fws.gov/ecp/species/7058#crithab	Final
Vernal Pool Fairy Shrimp <i>Branchinecta lynchi</i> https://ecos.fws.gov/ecp/species/498#crithab	Final
Vernal Pool Tadpole Shrimp <i>Lepidurus packardii</i> https://ecos.fws.gov/ecp/species/2246#crithab	Final

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act¹ and the Bald and Golden Eagle Protection Act².

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described [below](#).

1. The [Migratory Birds Treaty Act](#) of 1918.
2. The [Bald and Golden Eagle Protection Act](#) of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern <http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php>
- Measures for avoiding and minimizing impacts to birds <http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php>
- Nationwide conservation measures for birds <http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf>

The birds listed below are birds of particular concern either because they occur on the [USFWS Birds of Conservation Concern](#) (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ [below](#). This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the [E-bird data mapping tool](#) (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found [below](#).

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME

BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE.

"BREEDS ELSEWHERE" INDICATES
THAT THE BIRD DOES NOT LIKELY
BREED IN YOUR PROJECT AREA.)

Allen's Hummingbird *Selasphorus sasin*

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

<https://ecos.fws.gov/ecp/species/9637>

Breeds Feb 1 to Jul 15

Bald Eagle *Haliaeetus leucocephalus*

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

<https://ecos.fws.gov/ecp/species/1626>

Breeds Jan 1 to Aug 31

Clark's Grebe *Aechmophorus clarkii*

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Breeds Jun 1 to Aug 31

Common Yellowthroat *Geothlypis trichas sinuosa*

This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

<https://ecos.fws.gov/ecp/species/2084>

Breeds May 20 to Jul 31

Golden Eagle *Aquila chrysaetos*

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

<https://ecos.fws.gov/ecp/species/1680>

Breeds Jan 1 to Aug 31

Nuttall's Woodpecker *Picoides nuttallii*

This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

<https://ecos.fws.gov/ecp/species/9410>

Breeds Apr 1 to Jul 20

Oak Titmouse *Baeolophus inornatus*

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

<https://ecos.fws.gov/ecp/species/9656>

Breeds Mar 15 to Jul 15

Olive-sided Flycatcher *Contopus cooperi*

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

<https://ecos.fws.gov/ecp/species/3914>

Breeds May 20 to Aug 31

Tricolored Blackbird *Agelaius tricolor*

Breeds Mar 15 to Aug 10

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

<https://ecos.fws.gov/ecp/species/3910>

Willet *Tringa semipalmata*

Breeds elsewhere

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Wrentit *Chamaea fasciata*

Breeds Mar 15 to Aug 10

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Yellow-billed Magpie *Pica nuttalli*

Breeds Apr 1 to Jul 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

<https://ecos.fws.gov/ecp/species/9726>

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is $0.25/0.25 = 1$; at week 20 it is $0.05/0.25 = 0.2$.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (■)

Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)

Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

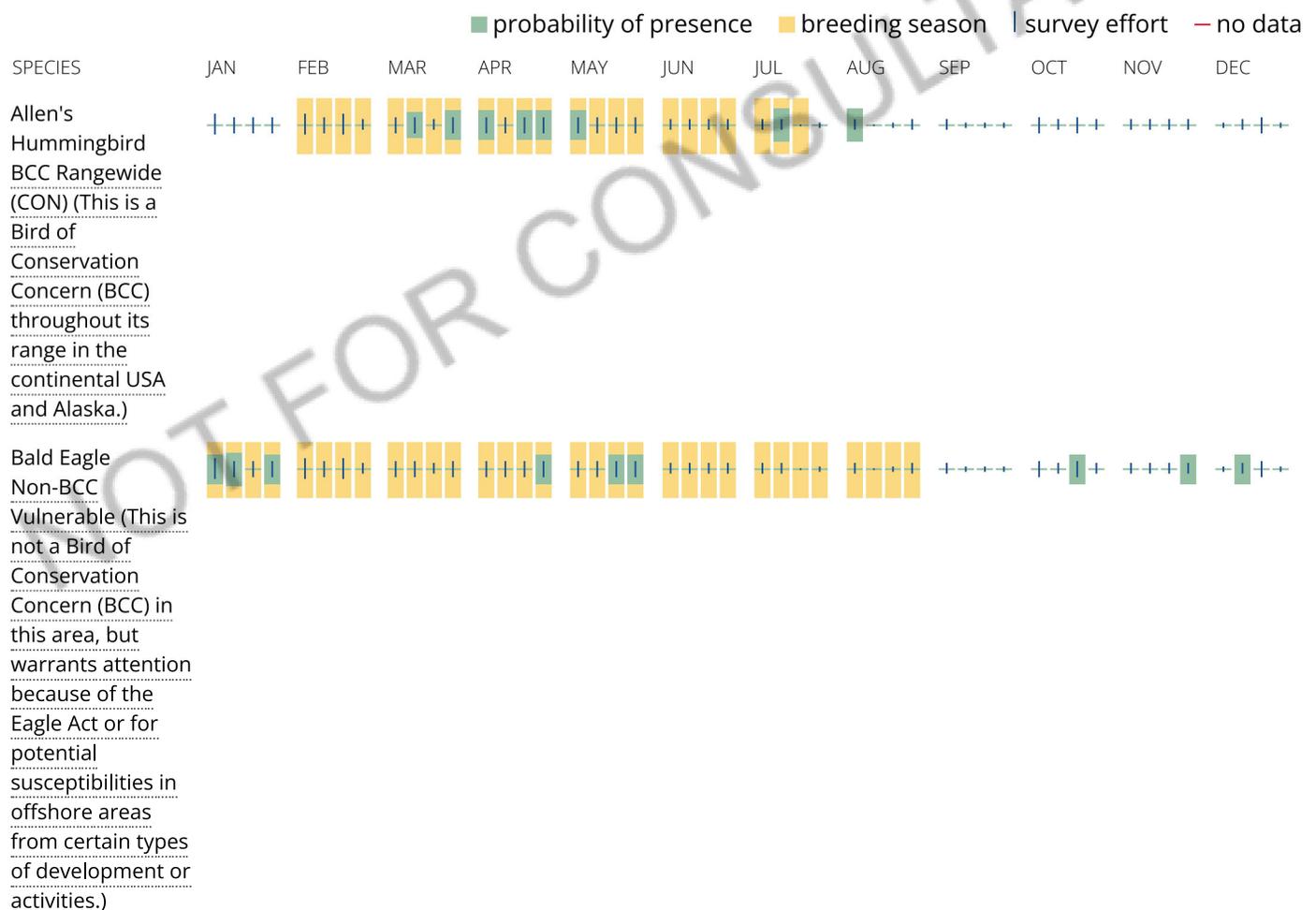
To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (—)

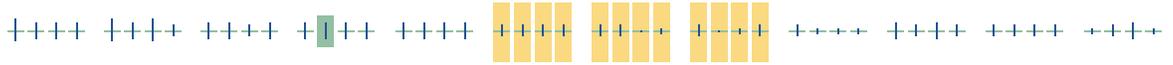
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe

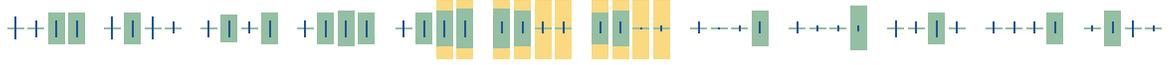
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



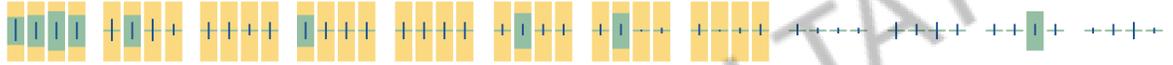
Clark's Grebe
 BCC Rangewide
 (CON) (This is a
 Bird of
 Conservation
 Concern (BCC)
 throughout its
 range in the
 continental USA
 and Alaska.)



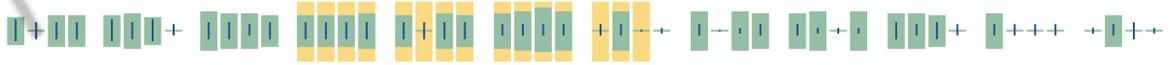
Common
 Yellowthroat
 BCC - BCR (This is a
 Bird of
 Conservation
 Concern (BCC) only
 in particular Bird
 Conservation
 Regions (BCRs) in
 the continental
 USA)



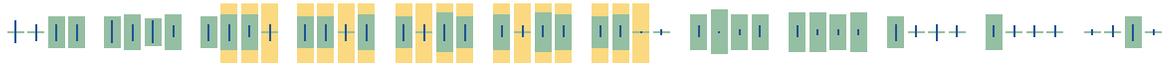
Golden Eagle
 Non-BCC
 Vulnerable (This is
 not a Bird of
 Conservation
 Concern (BCC) in
 this area, but
 warrants attention
 because of the
 Eagle Act or for
 potential
 susceptibilities in
 offshore areas
 from certain types
 of development or
 activities.)



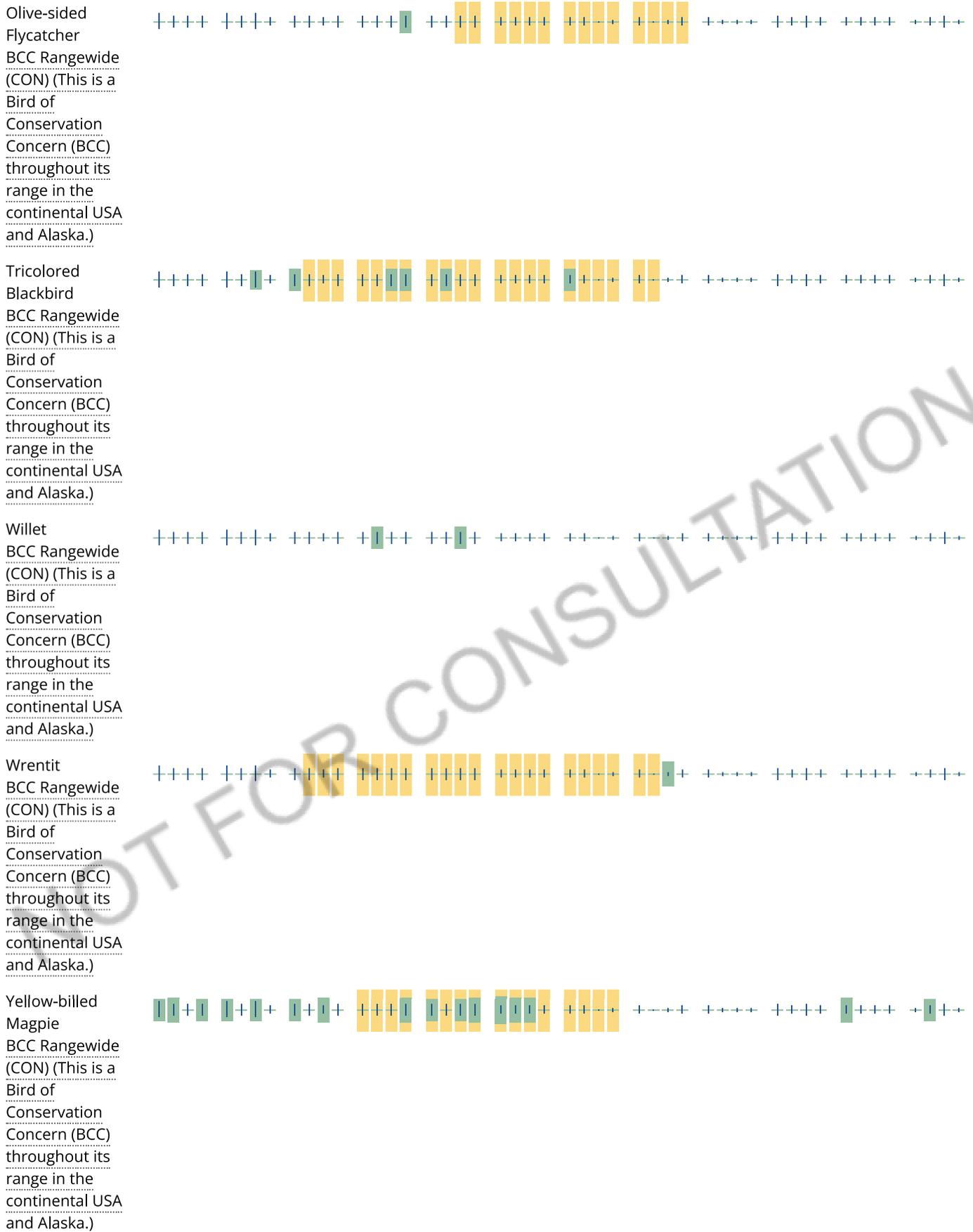
Nuttall's
 Woodpecker
 BCC - BCR (This is a
 Bird of
 Conservation
 Concern (BCC) only
 in particular Bird
 Conservation
 Regions (BCRs) in
 the continental
 USA)



Oak Titmouse
 BCC Rangewide
 (CON) (This is a
 Bird of
 Conservation
 Concern (BCC)
 throughout its
 range in the
 continental USA
 and Alaska.)



NOT FOR CONSULTATION



Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

[Nationwide Conservation Measures](#) describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. [Additional measures](#) or [permits](#) may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS [Birds of Conservation Concern \(BCC\)](#) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the [Avian Knowledge Network \(AKN\)](#). The AKN data is based on a growing collection of [survey, banding, and citizen science datasets](#) and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle ([Eagle Act](#) requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the [AKN Phenology Tool](#).

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the [Avian Knowledge Network \(AKN\)](#). This data is derived from a growing collection of [survey, banding, and citizen science datasets](#).

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go to the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: [The Cornell Lab of Ornithology All About Birds Bird Guide](#), or (if you are unsuccessful in locating the bird of interest there), the [Cornell Lab of Ornithology Neotropical Birds guide](#). If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are [Birds of Conservation Concern](#) (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the [Eagle Act](#) requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the [Northeast Ocean Data Portal](#). The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the [NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf](#) project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the [Diving Bird Study](#) and the [nanotag studies](#) or contact [Caleb Spiegel](#) or [Pam Loring](#).

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to [obtain a permit](#) to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the [National Wildlife Refuge](#) system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to [NWI wetlands](#) and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local [U.S. Army Corps of Engineers District](#).

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

FRESHWATER EMERGENT WETLAND

[PEM1Ah](#)

[PEM1Ch](#)

RIVERINE

[R4SBAx](#)

[R3UBHx](#)

A full description for each wetland code can be found at the [National Wetlands Inventory website](#)

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tubercid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

NOT FOR CONSULTATION

Search Results

68 matches found. Click on scientific name for details

Search Criteria: 9-Quad include [3812137:3812231:3812138:3812117:3812127:3812118:3812211:3812221:3812128]

▲ SCIENTIFIC NAME	COMMON NAME	FAMILY	LIFEFORM	BLOOMING PERIOD	FED LIST	STATE LIST	GLOBAL RANK	STATE RANK	CA RARE PLANT RANK	PHOTO
<u><i>Astragalus tener</i></u> <u>var. <i>ferrisiae</i></u>	Ferris' milk-vetch	Fabaceae	annual herb	Apr-May	None	None	G2T1	S1	1B.1	No Photo Available
<u><i>Astragalus tener</i></u> <u>var. <i>tener</i></u>	alkali milk-vetch	Fabaceae	annual herb	Mar-Jun	None	None	G2T1	S1	1B.2	No Photo Available
<u><i>Atriplex cordulata</i></u> <u>var. <i>cordulata</i></u>	heartscale	Chenopodiaceae	annual herb	Apr-Oct	None	None	G3T2	S2	1B.2	No Photo Available
<u><i>Atriplex coronata</i></u> <u>var. <i>coronata</i></u>	crownscale	Chenopodiaceae	annual herb	Mar-Oct	None	None	G4T3	S3	4.2	No Photo Available
<u><i>Atriplex depressa</i></u>	brittlescale	Chenopodiaceae	annual herb	Apr-Oct	None	None	G2	S2	1B.2	No Photo Available
<u><i>Atriplex persistens</i></u>	vernal pool smallscale	Chenopodiaceae	annual herb	Jun-Oct	None	None	G2	S2	1B.2	No Photo Available
<u><i>Blepharizonia plumosa</i></u>	big tarplant	Asteraceae	annual herb	Jul-Oct	None	None	G1G2	S1S2	1B.1	No Photo Available
<u><i>Carex lyngbyei</i></u>	Lyngbye's sedge	Cyperaceae	perennial rhizomatous herb	Apr-Aug	None	None	G5	S3	2B.2	No Photo Available
<u><i>Castilleja ambigua</i></u> <u>var. <i>ambigua</i></u>	johnny-nip	Orobanchaceae	annual herb (hemiparasitic)	Mar-Aug	None	None	G4T4	S3S4	4.2	No Photo Available
<u><i>Centromadia parryi</i></u> ssp. <u><i>congdonii</i></u>	Congdon's tarplant	Asteraceae	annual herb	May- Oct(Nov)	None	None	G3T1T2	S1S2	1B.1	No Photo Available
<u><i>Centromadia parryi</i></u> ssp. <u><i>parryi</i></u>	pappose tarplant	Asteraceae	annual herb	May-Nov	None	None	G3T2	S2	1B.2	No Photo Available
<u><i>Centromadia parryi</i></u> ssp. <u><i>rudis</i></u>	Parry's rough tarplant	Asteraceae	annual herb	May-Oct	None	None	G3T3	S3	4.2	No Photo Available
<u><i>Chloropyron molle</i></u> ssp. <u><i>hispidum</i></u>	hispid salty bird's-s-beak	Orobanchaceae	annual herb (hemiparasitic)	Jun-Sep	None	None	G2T1	S1	1B.1	No Photo Available

<u><i>Chloropyron molle</i></u> <u><i>ssp. molle</i></u>	soft salty bird's-beak	Orobanchaceae	annual herb (hemiparasitic)	Jun-Nov	FE	CR	G2T1	S1	1B.2	No Photo Available
<u><i>Cicuta maculata</i></u> <u><i>var. bolanderi</i></u>	Bolander's water-hemlock	Apiaceae	perennial herb	Jul-Sep	None	None	G5T4T5	S2?	2B.1	No Photo Available
<u><i>Cirsium</i></u> <u><i>hydrophilum</i></u> <u><i>var.</i></u> <u><i>hydrophilum</i></u>	Suisun thistle	Asteraceae	perennial herb	Jun-Sep	FE	None	G2T1	S1	1B.1	No Photo Available
<u><i>Convolvulus</i></u> <u><i>simulans</i></u>	small-flowered morning-glory	Convolvulaceae	annual herb	Mar-Jul	None	None	G4	S4	4.2	No Photo Available
<u><i>Cryptantha</i></u> <u><i>hooveri</i></u>	Hoover's cryptantha	Boraginaceae	annual herb	Apr-May	None	None	GH	SH	1A	No Photo Available
<u><i>Delphinium</i></u> <u><i>recurvatum</i></u>	recurved larkspur	Ranunculaceae	perennial herb	Mar-Jun	None	None	G2?	S2?	1B.2	No Photo Available
<u><i>Downingia pusilla</i></u>	dwarf downingia	Campanulaceae	annual herb	Mar-May	None	None	GU	S2	2B.2	No Photo Available
<u><i>Eleocharis parvula</i></u>	small spikerush	Cyperaceae	perennial herb	(Apr)Jun- Aug(Sep)	None	None	G5	S3	4.3	No Photo Available
<u><i>Erigeron biolettii</i></u>	streamside daisy	Asteraceae	perennial herb	Jun-Oct	None	None	G3?	S3?	3	No Photo Available
<u><i>Eriogonum nudum</i></u> <u><i>var. psychicola</i></u>	Antioch Dunes buckwheat	Polygonaceae	perennial herb	Jul-Oct	None	None	G5T1	S1	1B.1	No Photo Available
<u><i>Eriogonum</i></u> <u><i>truncatum</i></u>	Mt. Diablo buckwheat	Polygonaceae	annual herb	Apr- Sep(Nov- Dec)	None	None	G1	S1	1B.1	No Photo Available
<u><i>Eryngium jepsonii</i></u>	Jepson's coyote- thistle	Apiaceae	perennial herb	Apr-Aug	None	None	G2	S2	1B.2	No Photo Available
<u><i>Erysimum</i></u> <u><i>capitatum</i></u> <u><i>var.</i></u> <u><i>angustatum</i></u>	Contra Costa wallflower	Brassicaceae	perennial herb	Mar-Jul	FE	CE	G5T1	S1	1B.1	No Photo Available
<u><i>Eschscholzia</i></u> <u><i>rhombipetala</i></u>	diamond- petaled California poppy	Papaveraceae	annual herb	Mar-Apr	None	None	G1	S1	1B.1	No Photo Available
<u><i>Extriplex</i></u> <u><i>joaquinana</i></u>	San Joaquin spearscale	Chenopodiaceae	annual herb	Apr-Oct	None	None	G2	S2	1B.2	No Photo Available
<u><i>Fritillaria agrestis</i></u>	stinkbells	Liliaceae	perennial bulbiferous herb	Mar-Jun	None	None	G3	S3	4.2	No Photo

<u><i>Fritillaria liliacea</i></u>	fragrant fritillary	Liliaceae	perennial bulbiferous herb	Feb-Apr	None	None	G2	S2	1B.2	No Photo Available
<u><i>Fritillaria pluriflora</i></u>	adobe-lily	Liliaceae	perennial bulbiferous herb	Feb-Apr	None	None	G2G3	S2S3	1B.2	No Photo Available
<u><i>Gratiola heterosepala</i></u>	Boggs Lake hedge-hyssop	Plantaginaceae	annual herb	Apr-Aug	None	CE	G2	S2	1B.2	No Photo Available
<u><i>Hesperovax caulescens</i></u>	hogwallow starfish	Asteraceae	annual herb	Mar-Jun	None	None	G3	S3	4.2	No Photo Available
<u><i>Hesperolinon breweri</i></u>	Brewer's western flax	Linaceae	annual herb	May-Jul	None	None	G2	S2	1B.2	No Photo Available
<u><i>Hibiscus lasiocarpus var. occidentalis</i></u>	woolly rose- mallow	Malvaceae	perennial rhizomatous herb (emergent)	Jun-Sep	None	None	G5T3	S3	1B.2	No Photo Available
<u><i>Iris longipetala</i></u>	coast iris	Iridaceae	perennial rhizomatous herb	Mar- May(Jun)	None	None	G3	S3	4.2	No Photo Available
<u><i>Isocoma arguta</i></u>	Carquinez goldenbush	Asteraceae	perennial shrub	Aug-Dec	None	None	G1	S1	1B.1	No Photo Available
<u><i>Lasthenia chrysantha</i></u>	alkali-sink goldfields	Asteraceae	annual herb	Feb-Apr	None	None	G2	S2	1B.1	No Photo Available
<u><i>Lasthenia conjugens</i></u>	Contra Costa goldfields	Asteraceae	annual herb	Mar-Jun	FE	None	G1	S1	1B.1	No Photo Available
<u><i>Lasthenia ferrisiae</i></u>	Ferris' goldfields	Asteraceae	annual herb	Feb-May	None	None	G3	S3	4.2	No Photo Available
<u><i>Lasthenia glabrata ssp. coulteri</i></u>	Coulter's goldfields	Asteraceae	annual herb	Feb-Jun	None	None	G4T2	S2	1B.1	No Photo Available
<u><i>Lathyrus jepsonii var. jepsonii</i></u>	Delta tule pea	Fabaceae	perennial herb	May- Jul(Aug- Sep)	None	None	G5T2	S2	1B.2	No Photo Available
<u><i>Legenere limosa</i></u>	legenere	Campanulaceae	annual herb	Apr-Jun	None	None	G2	S2	1B.1	No Photo Available
<u><i>Lepidium latipes var. heckardii</i></u>	Heckard's pepper-grass	Brassicaceae	annual herb	Mar-May	None	None	G4T1	S1	1B.2	No Photo Available
<u><i>Lessingia hololeuca</i></u>	woolly-headed lessingia	Asteraceae	annual herb	Jun-Oct	None	None	G2G3	S2S3	3	No Photo

<u><i>Lilaeopsis masonii</i></u>	Mason's lilaepsis	Apiaceae	perennial rhizomatous herb	Apr-Nov	None	CR	G2	S2	1B.1	No Photo Available
<u><i>Lilium rubescens</i></u>	redwood lily	Liliaceae	perennial bulbiferous herb	Apr-Aug(Sep)	None	None	G3	S3	4.2	No Photo Available
<u><i>Limosella australis</i></u>	Delta mudwort	Scrophulariaceae	perennial stoloniferous herb	May-Aug	None	None	G4G5	S2	2B.1	No Photo Available
<u><i>Lupinus albifrons</i></u> <u>var. <i>abramsii</i></u>	Abrams' lupine	Fabaceae	perennial herb	Apr-Jun	None	None	G5T3?Q	S3?	3.2	No Photo Available
<u><i>Meesia triquetra</i></u>	three-ranked hump moss	Meesiaceae	moss	Jul	None	None	G5	S4	4.2	 Steve Matson 2008
<u><i>Microseris paludosa</i></u>	marsh microseris	Asteraceae	perennial herb	Apr-Jun(Jul)	None	None	G2	S2	1B.2	No Photo Available
<u><i>Myosurus minimus</i></u> <u>ssp. <i>apus</i></u>	little mousetail	Ranunculaceae	annual herb	Mar-Jun	None	None	G5T2Q	S2	3.1	No Photo Available
<u><i>Navarretia leucocephala</i></u> ssp. <u><i>bakeri</i></u>	Baker's navarretia	Polemoniaceae	annual herb	Apr-Jul	None	None	G4T2	S2	1B.1	No Photo Available
<u><i>Neostapfia colusana</i></u>	Colusa grass	Poaceae	annual herb	May-Aug	FT	CE	G1	S1	1B.1	No Photo Available
<u><i>Oenothera deltoides</i></u> ssp. <u><i>howellii</i></u>	Antioch Dunes evening-primrose	Onagraceae	perennial herb	Mar-Sep	FE	CE	G5T1	S1	1B.1	No Photo Available
<u><i>Orcuttia inaequalis</i></u>	San Joaquin Valley Orcutt grass	Poaceae	annual herb	Apr-Sep	FT	CE	G1	S1	1B.1	No Photo Available
<u><i>Perideridia gairdneri</i></u> ssp. <u><i>gairdneri</i></u>	Gairdner's yampah	Apiaceae	perennial herb	Jun-Oct	None	None	G5T3T4	S3S4	4.2	No Photo Available
<u><i>Plagiobothrys hystriculus</i></u>	bearded popcornflower	Boraginaceae	annual herb	Apr-May	None	None	G2	S2	1B.1	No Photo Available
<u><i>Puccinellia simplex</i></u>	California alkali grass	Poaceae	annual herb	Mar-May	None	None	G3	S2	1B.2	No Photo Available
<u><i>Senecio hydrophiloides</i></u>	sweet marsh ragwort	Asteraceae	perennial herb	May-Aug	None	None	G5	S3	4.2	 © 2021 Scot

<i>Sidalcea keckii</i>	Keck's checkerbloom	Malvaceae	annual herb	Apr-May(Jun)	FE	None	G2	S2	1B.1	No Photo Available
<i>Spergularia macrotheca</i> var. <i>longistyla</i>	long-styled sand-spurrey	Caryophyllaceae	perennial herb	Feb-May	None	None	G5T2	S2	1B.2	No Photo Available
<i>Stuckenia filiformis</i> ssp. <i>alpina</i>	northern slender pondweed	Potamogetonaceae	perennial rhizomatous herb (aquatic)	May-Jul	None	None	G5T5	S2S3	2B.2	 Dana York (2016)
<i>Symphotrichum lentum</i>	Suisun Marsh aster	Asteraceae	perennial rhizomatous herb	(Apr)May-Nov	None	None	G2	S2	1B.2	No Photo Available
<i>Trifolium amoenum</i>	two-fork clover	Fabaceae	annual herb	Apr-Jun	FE	None	G1	S1	1B.1	No Photo Available
<i>Trifolium hydrophilum</i>	saline clover	Fabaceae	annual herb	Apr-Jun	None	None	G2	S2	1B.2	No Photo Available
<i>Tuctoria mucronata</i>	Crampton's tuctoria or Solano grass	Poaceae	annual herb	Apr-Aug	FE	CE	G1	S1	1B.1	No Photo Available
<i>Viburnum ellipticum</i>	oval-leaved viburnum	Adoxaceae	perennial deciduous shrub	May-Jun	None	None	G4G5	S3?	2B.3	 © 2006 Tom Engstrom

Showing 1 to 68 of 68 entries

Suggested Citation:

California Native Plant Society, Rare Plant Program. 2021. Inventory of Rare and Endangered Plants of California (online edition, v9-01 1.0). Website <https://www.rareplants.cnps.org> [accessed 9 November 2021].

CONTACT US

Send questions and comments to rareplants@cnps.org.

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[The Jepson Flora Project](#)
[The Consortium of California Herbaria](#)
[CalPhotos](#)

APPENDIX B.

Species Evaluated Table

Species Evaluated Table.

Special-Status Species/ Common Name	Federal Status ^a	State Status _{ab}	Source ^c	Solano HCP ^d	Habitat Requirements	Potential to Occur within the Study Area?
Invertebrates						
<i>Apodemia mormo langei</i> Lange's metalmark butterfly	E	--	2	No	All life stages of Lange's metalmark are closely tied to Antioch Dunes buckwheat (<i>Eriogonum nudum</i> var. <i>psychicola</i> ; formerly var. <i>auriculatum</i>). This host plant, endemic to the Antioch Dunes, serves as the primary nectar source for adult butterflies, as sites for oviposition, and as the larval foodplant. Found only within the Antioch Dunes National Wildlife Refuge, a very limited geographic area representing the entirety of the known range-wide native population (USFWS 2020).	No. There are no host plants in the BSA. There are no known populations in Solano Co.
<i>Bombus crotchii</i> Crotch bumble bee	--	C	2	No	Inhabits open grassland and scrub habitats. Primarily nests underground. Generalist foragers visiting a wide variety of flowering plants including plants in the Fabaceae, Apocynaceae, Asteraceae, Lamiaceae, and Boraginaceae plant families. Requires floral resources distributed over the spring, summer, and fall. Isolated patches of habitat are not sufficient to fully support bumble bee populations. Historically common in the Central Valley, now considered extirpated from the northernmost part of the Valley, and nearly absent from near Arbuckle, south (Hatfield et al. 2014; Xerces 2018).	No. The BSA and surrounding landscape are heavily disturbed and/or cultivated and generally lacks floral resources over the spring, summer, and fall. The BSA is outside the current range.
<i>Bombus occidentalis</i> Western bumble bee	--	C	2	No	Colony-nesting bumble bee found in meadows and grasslands with abundant floral sources. Requires adequate nectar and pollen supplies from February to November. Common nectar sources include <i>Cirsium</i> , <i>Eriogonum</i> , <i>Solidago</i> , <i>Aster</i> , and <i>Ceanothus</i> . Requires floral resources distributed over the spring, summer, and fall. Nests in underground cavities such as squirrel burrows and in open west- and southwest-facing slopes often bordered by trees. Occasionally nests above ground in logs. Isolated patches of habitat are not sufficient to fully support bumble bee populations. Historically common on the west coast of North America from southern British Columbia, through central CA, south to NM. In CA, western bumble bee is now restricted to high-elevation Sierra Nevada sites and a few records along the north coast (Xerces 2018).	No. The BSA and surrounding landscape are heavily disturbed and/or cultivated and generally lacks floral resources over the spring, summer, and fall. The BSA is outside the current range.
<i>Branchinecta conservacion</i> Conservancy fairy shrimp	CH, E	--	2	Yes	Occurs in swales in grassland communities and in large turbid vernal pools, where rooted vegetation is absent (USFWS 1994a). Known from eight populations in CA: Vina Plains, Butte and Tehama cos.; Sacramento National Wildlife Refuge, Glenn Co.; Yolo Bypass Wildlife Area, Yolo Co.; Jepson Prairie, Solano Co.; Mapes Ranch, Stanislaus Co.; University of CA, Merced, Merced Co.; Grasslands Ecological Area, Merced Co.; and Los Padres National Forest, Ventura Co. At Jepson Prairie, the conservancy fairy shrimp is found in large playa-like depressions on deep alluvial soils of Pescadero Clay Loam on Basin Rim landforms (USFWS 2007a).	Yes. See discussion. The BSA is within designated critical habitat for this species.

Special-Status Species/ Common Name	Federal Status ^a	State Status ^{ab}	Source ^c	Solano HCP ^d	Habitat Requirements	Potential to Occur within the Study Area?
<i>Branchinecta lynchi</i> Vernal pool fairy shrimp	CH, T	--	1, 2	Yes	Occurs in vernal pools or vernal pool-like habitats. Does not occur in riverine contexts or in permanent waters. Found in 28 counties across the Central Valley and coast ranges of CA, and in southern OR. Most commonly found in small (< 0.05 ac), clear to tea-colored vernal pools with mud, grass, or basalt bottoms in unplowed grasslands (USFWS 2005a).	Yes. See discussion. The BSA is within designated critical habitat for this species.
<i>Callophrys mossii bayensis</i> San Bruno elfin butterfly	CH, E	--	1	No	Found on rocky outcrops and cliffs in the coastal mountains of San Francisco Bay, especially in the fog belt of steep, north-facing slopes receiving little direct sunlight. Larvae feed exclusively on broadleaf stonecrop (<i>Sedum spathulifolium</i>), which is associated with rocky outcrops at 900 to 1,075 ft. Known from San Mateo Co. (San Bruno Mtn, Milagra Ridge near Pacifica, Montara Mtn between Shelter Cove and Half Moon Bay, and Whiting Ridge just south of Shelter Cove); Contra Costa Co. (Mt. Diablo); and Marin Co. (Alpine Lake and Dillon Beach) (Black and Vaughan 2005; USFWS 2007c).	No. The BSA is out of this species' range. No broadleaf stonecrop occurs in the BSA. The BSA is not within proposed critical habitat for this species.
<i>Desmocerus californicus dimorphus</i> Valley elderberry longhorn beetle	CH, T	--	1, 2	Yes	Requires an elderberry shrub (<i>Sambucus</i> sp.) as a host plant (USFWS 2014). Occurs throughout the Central Valley, from approximately Shasta Co. to Fresno Co. Their range includes the valley floor and lower foothills, with a majority documented below 500 ft above sea level (USFWS 2017b).	No. No elderberry shrubs occur in the BSA or nearby. The BSA is not within designated critical habitat for this species.
<i>Elaphrus viridis</i> Delta green ground beetle	CH, T	--	1, 2	No	Typically found along the margins of vernal pools and in bare areas along trails and roadsides, where individuals often hide in cracks in the mud and under low-growing vegetation. The habitat characteristics most strongly associated with the beetle's presence include <i>Navarretia</i> cover, proximity to water, <i>Frankenia</i> cover, <i>Downingia</i> cover, soil type, and cracks in the soil. During a survey in 2007, adult Delta green ground beetles were found at 32 of 81 playa pools located east of Travis Air Force Base and west of Highway 113 (USFWS 2009).	Yes. See discussion. The BSA is not within proposed critical habitat for this species.
<i>Hydrochara rickseckeri</i> Ricksecker's water scavenger beetle	--	--	3	No	Aquatic beetle that inhabits vernal pools and swales, seasonal wetlands, and other ephemeral habitats. Occurs in the Central Valley below 980 ft. Once thought endemic to the San Francisco Bay region, but recent collections have been made in Solano Co and from vernal pools in Sacramento and Placer cos (SSHCP 2018).	Yes. See discussion.
<i>Lepidurus packardii</i> Vernal pool tadpole shrimp	CH, E	--	1, 2	No	Occurs in large, deep vernal pools, but can also make use of smaller pools within larger vernal pool complexes (USFWS 2005a).	Yes. See discussion. The BSA is within designated critical habitat for this species.

Special-Status Species/ Common Name	Federal Status ^a	State Status ^{ab}	Source ^c	Solano HCP ^d	Habitat Requirements	Potential to Occur within the Study Area?
<i>Speyeria callippe callippe</i> Callippe silverspot butterfly	CH, E	--	2		Inhabits coastal dunes, terrace prairie, bluff scrub, and associated grassland. Females lay their eggs on the dry remains of the larval food-plant, Johnny jump-up (<i>Viola pedunculata</i>). Flight period is from mid-May to late July. Since 1988, Callippe silverspot butterflies have been recorded at San Bruno Mtn and Sign Hill near South San Francisco (San Mateo Co), in the hills near Pleasanton (Alameda Co), at Sears Point (Sonoma Co), and in the hills between Vallejo and Cordelia (USFWS 1997).	No. The BSA is outside of this species' range. No Johnny jump-ups were observed in the BSA during protocol botanical surveys. The BSA is not within proposed critical habitat for this species.
<i>Danaus plexippus plexippus</i> Monarch butterfly	C	--	2, 3	No	The western population of the monarch butterfly typically breeds and forages west of the Rocky Mtns in the spring and summer, and migrates to generational overwintering sites in wooded groves along the CA coast in the late summer and fall. Milkweeds (<i>Asclepias</i> spp.) are obligate larval host plants. Overwintering habitats are tree groves that occur within 1.5 mi of the coast or San Francisco Bay area, where proximity to large water bodies moderates temperature fluctuations. Suitable groves have temperatures above freezing, high humidity, dappled sunlight, access to water and nectar, and protection from high winds and storms. Monarchs will select the native Monterey pine, Monterey cypress, western sycamore, and other native tree species when they are available, but will also utilize non-native eucalyptus species if other optimal habitat conditions are met (WAFWA 2019).	Yes. A few narrow-leaved milkweed (<i>Asclepias fascicularis</i>) plants occur in the BSA. There is no overwintering habitat. See discussion.
Fish						
<i>Acipenser medirostris</i> Green sturgeon sDPS	CH, E	SSC	1	Yes	An anadromous species that moves up large rivers to spawn (McGinnis 1984). Spawning in the mainstem Sacramento River has been documented at sites over 240 mi both downstream and upstream of Red Bluff Diversion Dam (Brown, 2007). Spawning most likely occurs in fast, deep water (10+ ft deep) over substrates ranging from clean sand to bedrock, with preferences for cobble substrates (Emmett et al., 1991; Moyle et al., 1995). Adults occur in the Sacramento River when temperatures are between 8 - 14°C (Moyle, 2002). Temperatures ≥ 73°F are lethal to embryos (Van Eenennaam et al., 2005). Deep pools ≥ 16 ft with high turbulence and upwelling are critical for spawning and summer holding within the Sacramento River (Corwin and Poytress 2008). Some spawning may occur in the lower San Joaquin River as young green sturgeon have been taken near Brannan Island State Recreation Area (Moyle 2002). In Solano Co, green sturgeon are mainly associated with the open water portions of the marshes and sloughs within the Coastal Marsh Natural Community (SCWA 2012).	No. There are no open water communities in the BSA and insufficient water is present in the marsh and drainage ditches to support any life stage. The two north-south drainages ditches in the BSA contain only a trickle of flow outside of storm events. The BSA is not within designated critical habitat for this species.

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<i>Archoplites interruptus</i> Sacramento perch	--	SSC	2	No	A freshwater fish that occurs in beds of rooted, submerged, and emergent vegetation and submerged objects. Beds of aquatic plants are important for young-of-year, although perch can achieve high numbers in shallow, highly turbid reservoirs with no aquatic plants (Moyle 2002). Sacramento perch are endemic to the Central Valley, the Pajaro and Salinas rivers, tributaries to the San Francisco Estuary (e.g., Alameda Creek), and Clear Lake generally at low elevations (<330 ft) except for Clear Lake. Today Sacramento perch are most likely extirpated from their native range. Sacramento perch exist in six California watersheds and are known to still be present in five Central Valley waters including Jewel Lake, Hume Lake, Sequioa Lake, San Luis Reservoir, and Almanor Reservoir (Moyle 2002).	No. There are no open water communities in the BSA and insufficient water is present in the marsh and drainage ditches to support any life stage. The two north-south drainages ditches in the BSA contain only a trickle of flow outside of storm events.
<i>Hypomesus transpacificus</i> Delta smelt	CH, T	E	2	Yes	Euryhaline (tolerant of a wide salinity range) species that is confined to the San Francisco Estuary, principally in the Delta and Suisun Bay. Occurs in the Delta primarily below Isleton on the Sacramento River side and below Mossdale on the San Joaquin River side. Found seasonally throughout Suisun Bay and in small numbers in larger sloughs of Suisun Marsh. Moves into sloughs and channels of the western Delta (e.g., Lindsey Slough) when spawning (mainly March-April). Can be washed into San Pablo Bay during high-outflow periods, but do not establish permanent populations there (Moyle 2002). In Solano Co, Delta smelt are mainly associated with the open water portions of the Coastal Marsh vegetation types within the plan area Coastal Marsh Natural Community (SCWA 2012).	No. There are no open water communities in the BSA and insufficient water is present in the marsh and drainage ditches to support any life stage. The two north-south drainages ditches in the BSA contain only a trickle of flow outside of storm events. The BSA is not within designated critical habitat for this species.
<i>Oncorhynchus mykiss</i> California Central Coast steelhead DPS	CH, T	--	1	Yes	Anadromous <i>O. mykiss</i> (steelhead) originating below natural and manmade impassable barriers from the Russian River south to and including Aptos Creek, and all drainages of San Francisco and San Pablo Bays eastward to Chipps Island at the confluence of the Sacramento and San Joaquin Rivers. Includes steelhead from two artificial propagation programs: Don Clausen Fish Hatchery Program, and Kingfisher Flat Hatchery Program (Monterey Bay Salmon and Trout Project) (NMFS 2014). Requires loose gravels at pool tails for spawning (Moyle et al. 2008). In Solano Co, steelhead are mainly associated with the open water portions of the Freshwater Marsh and Streams/Sloughs within the Plan Area Riparian, Streams, and Freshwater Marsh Natural Community. The species can also be found in open water areas of within the Coastal Marsh Natural Community (SCWA 2012).	No. There are no open water communities in the BSA and insufficient water is present in the marsh and drainage ditches to support any life stage. The two north-south drainages ditches in the BSA contain only a trickle of flow outside of storm events. Substrates and flows are not suitable for spawning. The BSA is not within designated critical habitat for this species.

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<i>Oncorhynchus mykiss</i> California Central Valley steelhead DPS	CH, T	--	1, 2	Yes	Anadromous <i>O. mykiss</i> (steelhead) that spawns in small tributaries on coarse gravel beds in riffle areas (Busby et al. 1996). Once thought extirpated from the San Joaquin Basin (Moyle 2002). Now potentially widespread throughout accessible streams and rivers in the Central Valley, including known populations or observations in Deer and Mill creeks in Tehama Co., the Yuba, Stanislaus, Mokelumne, Calaveras, Tuolumne, and Merced rivers, and other streams (NMFS 2009).	No. There are no open water communities in the BSA and insufficient water is present in the marsh and drainage ditches to support any life stage. The two north-south drainages ditches in the BSA contain only a trickle of flow outside of storm events. Substrates and flows are not suitable for spawning. The BSA is not within designated critical habitat for this species.
<i>Oncorhynchus tshawytscha</i> Central Valley fall/late fall-run Chinook salmon ESU	--	SSC	3	Yes	This ESU includes all naturally spawned populations of fall-run Chinook salmon in the Sacramento and San Joaquin River Basins and their tributaries east of Carquinez Strait (NMFS 2009). They are ocean-type salmon adapted for spawning in lowland reaches of big rivers and their tributaries. This anadromous species moves up from the ocean in late summer and early fall in mature condition and spawns within a few days or weeks of arriving on the spawning grounds. Juveniles emerge from the gravel in spring and move downstream within a few months to rear in the mainstem of rivers or estuaries before heading out to sea (Moyle et al. 2002). Adult female Chinook will prepare a spawning bed in a stream with suitable gravel composition, water depth, and velocity (McGinnis 1984). Chinook salmon are mainly associated with the open water portions of the Freshwater Marsh and Streams/Sloughs within the Plan Area's Riparian, Streams, and Freshwater Marsh Natural Community. The species can also be found in open water areas of within the Coastal Marsh Natural Community (SCWA 2012).	No. There are no open water communities in the BSA and insufficient water is present in the marsh and drainage ditches to support any life stage. The two north-south drainages ditches in the BSA contain only a trickle of flow outside of storm events. Substrates and flows are not suitable for spawning.
<i>Oncorhynchus tshawytscha</i> Central Valley spring-run Chinook salmon ESU	CH, T	T	1	Yes	Extant populations of this ESU spawn in the Sacramento River and its tributaries. Populations in the San Joaquin River are believed to be extirpated (NMFS 1998). Though historically found in Sacramento, San Joaquin, Klamath and Eel Rivers and their larger tributaries, today populations are only known to exist in the Sacramento and Klamath drainages (Moyle 2002). Adult female chinook will prepare a spawning bed in a stream with suitable gravel composition, water depth, and velocity (NMFS 2013). Enters the Sacramento River Basin from March through September and spawns from late August to October (Moyle 2002).	No. There are no open water communities in the BSA. Generally, the drainage ditches in the BSA are choked with overgrown vegetation and there is not enough water for fish access. During periods of particularly high flows, the culvert under Highway 12 may act as a velocity barrier to fish. The BSA is not within designated critical habitat for this species.

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<i>Oncorhynchus tshawytscha</i> Sacramento River winter-run Chinook salmon ESU	CH, E	E	1	Yes	Once found throughout the upper Sacramento River basin, the winter-run Chinook salmon ESU is now confined to the mainstem Sacramento River below Keswick Dam (Moyle 2002). Adults enter the Sacramento River from December through July and spawn from April to July. Spawning occurs in streams with suitable gravel composition, water depth, and velocity (McGinnis 1984). This ESU is believed to be extirpated from the San Joaquin River Basin. However, an intermittent run has been reported in the lower Calaveras River (NMFS 1998).	No. There are no open water communities in the BSA. Generally, the drainage ditches in the BSA are choked with overgrown vegetation and there is not enough water for fish access. During periods of particularly high flows, the culvert under Highway 12 may act as a velocity barrier to fish. The BSA is not within designated critical habitat for this species.
<i>Pogonichthys macrolepidotus</i> Sacramento splittail	--	SSC	2	Yes	Endemic to sloughs, lakes and rivers of CA, mainly in the Central Valley. Historically, non-estuarine dependent populations existed in the Central Valley, but they have been extirpated. Adapted to estuarine waters with fluctuating conditions, and tolerant of high salinities. Swims upstream from the Delta into areas with flooded vegetation when ready to spawn. Spawning occurs in late February to early July, mainly in the Sutter and Yolo Bypasses along the Sacramento River. Fertilized eggs are attached to submerged vegetation and debris. During most years confined to the Delta, Suisun Bay, Suisun Marsh, lower Napa River, lower Petaluma River, and other parts of the San Francisco Estuary (Moyle 2002). In Solano Co., Sacramento splittail are mainly associated with the open water portions of the Coastal Marsh vegetation in the Coastal Marsh Natural Community of the Plan Area (SCWA 2012).	No. There are no open water communities in the BSA. Generally, the drainage ditches in the BSA are choked with overgrown vegetation and there is not enough water for fish access. During periods of particularly high flows, the culvert under Highway 12 may act as a velocity barrier to fish.
<i>Spirinchus thaleichthys</i> Longfin smelt, San Francisco Bay-Delta DPS	C	T	2	Yes	An anadromous fish that spawns from November to June in freshwater over sandy-gravel substrates, rocks, or aquatic plants. After hatching, larvae move up into surface waters and are transported downstream into brackish-water nursery areas. In the San Francisco estuary, longfin smelt are usually found downstream of Rio Vista on the Sacramento River and from the vicinity of Medford Island downstream on the San Joaquin River. They are occasionally found upstream of these locations (Moyle 2002). In all years, longfin smelt are likely spawning in the Delta, Suisun Marsh and Suisun Bay. In dry years, longfin smelt can spawn in the upper Sacramento River and have been observed as far up as Colusa State Park (USFWS 2012).	No. There are no open water communities in the BSA. Generally, the drainage ditches in the BSA are choked with overgrown vegetation and there is not enough water for fish access. During periods of particularly high flows, the culvert under Highway 12 may act as a velocity barrier to fish.

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Amphibians						
<i>Ambystoma californiense</i> California tiger salamander, Central California DPS	CH, T	T	1, 2	Yes	Occurs in grassland, oak savannah, and edges of mixed woodland and lower elevation coniferous forest. Spends much time underground in mammal burrows. The Central CA DPS occurs in Alameda, Amador, Calaveras, Contra Costa, Fresno, Kern, Kings, Madera, Mariposa, Merced, Monterey, Sacramento, San Benito, San Mateo, San Joaquin, San Luis Obispo, Santa Clara, Santa Cruz, Stanislaus, Solano, Tulare, Tuolumne, and Yolo cos. (USFWS 2017a). Usually breeds in temporary ponds such as vernal pools but may also breed in slower parts of streams and some permanent waters (Stebbins 2003). Requires long-lasting vernal pools to complete larval development lasting 10+ weeks (Jennings and Hayes 1994).	Yes. Low potential. See discussion. The BSA is not within designated critical habitat for this species.
<i>Rana boylei</i> Foothill yellow-legged frog	--	CT/ SSC	2	No	Found in or near rocky streams in a variety of habitats, including valley-foothill hardwood, valley-foothill hardwood-conifer, valley-foothill riparian, Ponderosa pine, mixed conifer, coastal scrub, mixed chaparral, and wet meadows. Egg clusters are attached to gravel or rocks in moving water near stream margins. This species is rarely encountered (even on rainy nights) far from permanent water. Its elevation range extends from near sea level to 6,370 ft in the Sierra (CWHR 2021).	No. There are no rocky streams in or near the BSA.
<i>Rana draytonii</i> California red-legged frog	CH, T	SSC	1,2	Yes	Inhabits ponds, quiet pools of streams, marshes, and riparian areas with dense, shrubby, or emergent vegetation. Requires permanent or nearly permanent pools for larval development (CWHR 2021; USFWS 2010a). May use ephemeral water bodies for breeding if permanent water is nearby (Thomson et al. 2016). Occurs from near sea level to approximately 5,200 ft, though nearly all sightings have occurred below 3,500 ft. Probably extirpated from the floor of the Central Valley before 1960 (USFWS 2002). In Solano Co, extant records occur from the hills north of I-80 and in the tricity/county open space area roughly defined as the triangle formed by Interstate Highways 80, 680 and 780 between Vallejo, Cordelia, and Benicia (SCWA 2012).	No. The BSA is outside the species' range (SCWA 2012). The nearest record (CNDDDB Occurrence #306) is ± 9 mi southwest of the BSA at an elevation of 145 ft in hills of the Interior Coast Range southwest of Cordelia and I-680. The BSA is not within designated critical habitat for this species.
Reptiles						
<i>Anniella pulchra</i> Northern California legless lizard	--	SSC	2	No	Fossorial lizard that occurs in sparsely vegetated habitat including coastal sand dunes, chaparral, pine-oak woodland, desert scrub, open grassland, and riparian areas from 0 to 5,900 ft. Within these habitats, sandy or loose loamy substrates conducive to burrowing are required. Gravel and soils with more than ±10% clay content are not used. Known from the southern half of the Central Valley and surrounding foothills from Contra Costa and San Joaquin cos. southward, and from along the coast from approximately the City of Santa Cruz southward through Baja CA (Thomson et al. 2016).	No. The BSA is outside the species' range.

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<i>Arizona elegans occidentalis</i> California glossy snake	--	SSC	2	No	Nocturnal lizard that hides under rocks or in burrows during the day. Inhabits arid scrub, rocky washes, grasslands, and chaparral. Prefers open areas with loose soil for burrowing. Occurs from the eastern part of the San Francisco Bay Area south to northwestern Baja California. Generally, absent along the central coast (Nafis 2020).	No. The BSA is outside the species' range.
<i>Emys marmorata</i> Western pond turtle	--	SSC	2	No	Highly aquatic species found in a broad range of aquatic habitats including rivers and streams, permanent lakes, ponds, reservoirs, settling ponds, marshes, and other inundated wetlands. May use brackish, semi-permanent, or ephemeral features when inundated. Requires basking sites and loose soil in surrounding uplands suitable for nest excavation. Eggs are typically laid in spring and early summer in nests located within 330 ft of water. Eggs hatch in the fall, but hatchlings often remain in the nest through the first winter, emerging the following spring. Adults remain active year-round in warmer climates. In colder climates, adults overwinter in upland burrows safe from high winter flows. Occurs throughout non-desert CA from sea level to 6,700 ft Isolated populations are known from the Mojave, Susan, Truckee, and Carson rivers, and the Klamath Basin (Thomson et al. 2016).	Yes. See discussion.
<i>Thamnophis gigas</i> Giant garter snake	T	T	1, 2	Yes	Endemic to the wetlands of the Sacramento and San Joaquin valleys, inhabiting the tule marshes and seasonal wetlands created by overbank flooding of the rivers and streams. Requires 1) freshwater aquatic habitat with protective emergent vegetative cover that allows foraging; 2) upland habitat near the aquatic habitat that can be used for thermoregulation and summer shelter in burrows; and 3) upland refugia that serve as winter hibernacula (USFWS 2017).	No. The BSA is outside this species' range (SCWA 2012; CWHR 2021). In Solano Co, the range is based on three known records, confined to areas near the Yolo Bypass and the tidally influenced area in the eastern portion of the County (SCWA 2012). USGS conducted giant garter snake surveys in 2004 and 2005 at many locations, including the historical record sites in Solano Co that they determined would be most likely to support this species, but none were found (SCWA 2012). The nearest CNDDDB record (Occurrence #358) is over 10 mi south of the BSA along Grizzly Slough.

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Birds						
<i>Agelaius tricolor</i> Tricolored blackbird	--	T	2	Yes	Forages on ground in cropland, grassland, and on pond edges. Nests near freshwater, prefers emergent marsh of dense cattails or tules, but also nests in thickets of willow, blackberry, and wild rose. Highly colonial. Nesting area must be large enough to support a minimum colony of about 50 pairs (CWHR 2021). Nesting colonies are of concern to CDFW (2020).	Yes. See discussion.
<i>Ammodramus savannarum</i> Grasshopper sparrow	--	SSC	2	No	An uncommon local summer resident and breeder in foothills and lowlands west of the Cascade-Sierra Nevada crest from Mendocino and Trinity cos south to San Diego Co. Occurs in dry, dense grasslands, especially with scattered shrubs for sitting perches. A thick cover of grasses and forbs is essential for concealment. Nests are built of grasses and forbs in slight depressions in ground hidden by a clump of grasses or forbs. Usually nests solitarily from early April to mid-July. May form semicolonial breeding groups of 3-12 pairs (CWHR 2021). Nesting sites are of concern to CDFW (2020).	Yes. See discussion.
<i>Aquila chrysaetos</i> Golden eagle	--	FP	2	No	Uncommon permanent resident and migrant throughout CA, except in the central portion of the Central Valley. Ranges from sea level up to 11,500 ft (Grinnell and Miller 1944). Typically inhabits rolling foothills, mountainous areas, sage-juniper flats, and deserts. Uses secluded cliffs with overhanging ledges and large trees for cover. Nest on cliffs of all heights and in large trees in open areas. Rugged, open habitats with canyons and escarpments are used most frequently for nesting. Needs open terrain for hunting (CWHR 2021).	Yes. See discussion.
<i>Asio flammeus</i> Short-eared owl	--	SSC	2	No	This species inhabits open areas in annual and perennial grasslands, dunes, meadows, irrigated lands, and saline and freshwater emergent wetlands. Nests on dry ground in topographic depressions concealed in vegetation and occasionally in burrows. A widespread winter migrant, found primarily in the Central Valley, in the western Sierra Nevada foothills, and locally in the southern desert region. Occasionally breeds in northern CA (Zeiner et al. 1990a). Nesting sites are of concern to CDFW (2020).	Yes. See discussion.
<i>Athene cucularia</i> Burrowing owl	--	SSC	2	Yes	Yearlong resident of open, dry grassland and desert habitat, and in grass, forb, and open shrub stages of pinyon-juniper and Ponderosa pine habitats, from sea level to 5,300 ft. Uses small mammal burrows, often those of ground squirrels, for roosting and nesting cover. Nest boxes, pipes, and culverts may be used if burrows are scarce. Occurs throughout CA except the high mountains and northwestern coastal forests (CWHR 2021). Burrowing sites and some wintering sites are of concern to CDFW (2020).	Yes. See discussion.

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<i>Buteo swainsoni</i> Swainson's hawk	--	T	2	Yes	An uncommon breeding resident and migrant in CA in the Central Valley, Klamath Basin, Northeastern Plateau, Lassen Co., and Mojave Desert. Nests in open riparian habitat, in scattered trees or in small groves in sparsely vegetated flatlands. Forages in adjacent grasslands, grain or alfalfa fields, or livestock pastures. Feeds on rodents, mammals, reptiles, large arthropods, amphibians, small birds, and, rarely, fish (CWHR 2021). Nesting sites are of concern to CDFW (2020).	Yes. See discussion.
<i>Charadrius montanus</i> Mountain plover	--	SSC	2	No	This species does not nest in CA. It is a winter resident from September through March in the Central Valley from Sutter and Yuba cos. southward into Mexico at elevations below 3,200 ft. Also found in foothill valleys west of the San Joaquin Valley, the Imperial Valley, and plowed fields of Los Angeles and western San Bernardino cos. Mountain plover forages in short and open grasslands, plowed fields with little vegetation, and open sagebrush areas (CWHR 2021). Nonbreeding/wintering sites are of concern to CDFW (2020).	Yes. See discussion.
<i>Circus cyaneus</i> Northern Harrier	--	SSC	2	No	Occurs in annual grassland up to lodgepole pine and alpine meadow habitat as high as 10,000 ft. Breeds from sea level to 5,700 ft in the Central Valley and Sierra Nevada Mountains, and up to 3,600 ft in northeastern CA. Frequents meadows, grasslands, open rangelands, desert sinks, fresh and saltwater emergent wetland, though seldom found in wooded areas. Uses tall grasses and forbs in wetlands, or at the wetland/field border, for cover. Roosts and nests on the ground in shrubby vegetation, usually at marsh edges. Mostly nests in emergent wetlands or along rivers or lakes, but may nest in grasslands, grain fields, or on sagebrush flats several miles from water (CWHR 2021). Nesting sites are of concern to CDFW (2020).	Yes. See discussion.
<i>Coturnicops noveboracensis</i> Yellow rail	--	SSC	2	No	Occurs in shallow marshes and wet meadows, including brackish marshes and rice fields (Cornell 2018). Requires sedge marshes/meadows with moist soil or shallow standing water for breeding (Shuford and Gardali 2008). Occurs year round in CA, but in two primary seasonal roles: as a very local breeder in the northeastern interior and as a winter visitor (early Oct to mid-Apr) on the coast and in the Suisun Marsh region (Shuford and Gardali 2008).	Yes. See discussion.
<i>Elanus leucurus</i> White-tailed kite	--	FP	2	No	Yearlong resident in coastal and valley lowlands. Rarely found away from agricultural areas. Inhabits herbaceous and open stages of most habitats, mostly in cismontane California. Substantial groves of dense, broad-leaved deciduous trees are used for nesting and roosting. Nest placed near top of dense oak, willow, or other tree stand located near open foraging area. Forages in undisturbed, open grasslands, meadows, farmlands, and emergent wetlands (CWHR 2021).	Yes. See discussion

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<i>Geothlypis trichas sinuosa</i> Saltmarsh common yellowthroat	--	SSC	2	No	Nests in dense undergrowth in marshy and swampy areas, both fresh and brackish. Range includes four main areas: coastal riparian and wetland areas of western Marin Co., the tidal marsh system of San Pablo Bay, the tidal marsh system of southern San Francisco Bay, and coastal riparian and wetland areas in San Mateo Co. Additional disjunct populations occur at Stafford Lake, Marin Co.; Lake Merced, San Francisco Co.; and wet areas on San Bruno Mtn, San Mateo Co. (Shuford and Gardali 2008).	No. The BSA is out of this species' range.
<i>Icteria virens</i> Yellow-breasted chat	--	SSC	3	No	Uncommon summer resident and migrant in coastal CA and in the foothills of the Sierra Nevada. Found up to ± 4,800 ft in valley foothill riparian, and up to ± 6,500 ft east of the Sierra Nevada in desert riparian habitats (CWHR 2021). Widely distributed but rare or absent as a breeder in much of the Central Valley and parts of the southern coastal slopes. Occupies early successional riparian habitats with a well-developed shrub layer and an open canopy. Vegetation structure, more than age, appears to be the important factor in nest-site selection. Nesting habitat is usually restricted to the narrow border of streams, creeks, sloughs, and rivers and seldom forms extensive tracts. Blackberry, wild grape, willow, and other plants that form dense thickets and tangles are frequently selected for nesting. Taller trees such as cottonwood and alder are required for song perches (Shuford and Gardali 2008). Nesting sites are of concern (CDFW 2021b).	No. There is no habitat suitable for nesting in the BSA. The BSA is outside the predicted species range (CWHR 2021).
<i>Lanius ludovicianus</i> Loggerhead shrike	--	SSC	3	No	Resident in lowlands and foothills. Prefers open grasslands or scrub with shrubs or trees and low, sparse herbaceous cover with perches available (fences, posts, utility lines). Nests in a dense-foliaged shrub or tree (Shuford and Gardali 2008).	Yes. Observed foraging in the BSA during surveys. See discussion.
<i>Laterallus jamaicensis coturniculus</i> California black rail	--	T	2	Yes	Inhabits saline, brackish, and freshwater emergent wetlands in the Bay Area, Sacramento-San Joaquin Delta, the Salton Sea, the lower Colorado River, a few locations in coastal southern CA, and the northern Sierra foothills of Butte, Nevada, Placer, and Yuba cos. Typically found in the immediate vicinity of tidal sloughs near the upper limit of tidal flooding in tidal emergent wetlands dominated by pickleweed and in brackish marshes supporting bulrushes in association with pickleweed. In freshwater areas, generally found in marshes dominated by bulrush, cattail, or saltgrass (CWHR 2021). Water regime is a critical habitat factor; black rails are often found in wetlands with perennial standing or flowing water. Black rails use wetland zones with shallower water than other North American rails, generally less than 1.2 in. Wetlands in the Sacramento Valley managed for waterfowl or rice typically lack sufficient shallow water habitat (Richmond et al. 2010).	Yes. See discussion.

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<i>Melospiza melodia</i> Song sparrow, “Modesto Population”	--	SSC	2	No	A year-round resident that prefers emergent freshwater marshes dominated by tules and cattails as well as riparian willow thickets. Modesto song sparrows also nest in riparian forests of valley oak with sufficient understory of blackberry, along vegetated irrigation canals and levees, and in recently planted valley oak restoration sites. Endemic to CA, with established populations in the Sacramento Valley, Sacramento-San Joaquin River Delta, and northern San Joaquin Valley. The Modesto song sparrow thrives where extensive wetlands remain. Most abundant in the Butte Sink area of the Sacramento Valley and in the Sacramento-San Joaquin River Delta. Immediately adjacent to the Butte Sink, song sparrows breed in sparsely vegetated irrigation canals, although they are almost entirely absent from the main stem and tributaries of the Sacramento River above Sacramento (Shuford and Gardali 2008).	No. The BSA is outside of this species’ range.
<i>Melospiza melodia maxillaris</i> Suisun song sparrow	--	SSC	2	No	One of three morphologically distinct song sparrow subspecies endemic to the San Francisco Bay region. Inhabits freshwater marshes, wet meadows and shallow margins of saltwater marshes bordering larger bays. As with all song sparrow subspecies, dense vegetation is required for nesting sites, song perches, and cover for refuge from predators. A year-round resident restricted to the Suisun Marsh from the Carquinez Strait east to the confluence of the Sacramento and San Joaquin rivers near Antioch (Shuford and Gardali 2008).	Yes. See discussion.
<i>Melospiza melodia samuelis</i> San Pablo song sparrow	--	SSC	3		Endemic to CA where it is a year-round non-migratory resident restricted to tidal and muted tidal salt marshes fringing San Pablo Bay. Breeds from early March to July. Dense vegetation is necessary for nesting, perching, and cover from predators. The range extends eastward to the western edge of Solano Co. along the Mare Island Strait and Napa River (Shuford and Gardali 2008).	No. The BSA is outside of this species’ range.
<i>Rallus obsoletus obsoletus</i> (= <i>R. longirostris obsoletus</i>) California Ridgway’s rail	E	E	1,2	Yes	Found in coastal wetlands, saltwater and brackish marshes around San Francisco, Monterey, and Morro bays. Requires emergent wetlands and tidal sloughs. Nests mostly in lower marsh zones, where Pacific cordgrass (<i>Spartina foliosa</i>) is abundant and tidal sloughs are nearby (CWHR 2021). Nesting occurs March through August (USFWS 2010b). Typically inhabits marshes dominated by pickleweed (<i>Salicornia virginica</i>) and Pacific cordgrass, but also uses tidal brackish marshes which vary significantly in vegetation (CWHR 2011, USFWS 2010b). Currently restricted almost entirely to the marshes of the San Francisco estuary.	No. There is no suitable habitat in the BSA. No tidal marshes, sloughs, or cordgrass occur in the BSA. The small patch of coastal brackish marsh at the southern tip of the BSA is disturbed, isolated, of limited extent, and does not provide adequate cover.

Special-Status Species/ Common Name	Federal Status ^a	State Status _{ab}	Source ^c	Solano HCP ^d	Habitat Requirements	Potential to Occur within the Study Area?
<i>Sternula antillarum browni</i> California least tern	E	E	1,2	No	Inhabits willow thickets and other dense riparian habitat below ± 2,000 ft. Nests in colonies on relatively open beaches kept free of vegetation by natural scouring from tidal action. Their nest is a simple scrape in the sand or shell fragments (USFWS 2006). Known from canyons in San Benito and Monterey cos., coastal areas from Santa Barbara Co. south, and western edges of southern CA deserts. Usually found near water, including intermittent streams (CWHR 2021). Nesting colonies are of concern to CDFW (2020).	No. The BSA is outside this species' range. There is no suitable nesting habitat in the BSA.
<i>Xanthocephalus xanthocephalus</i> Yellow-headed blackbird	--	SSC	3	No	Breeds locally east of Cascade Range and Sierra Nevada, in the Central Valley, and selectively in Imperial and Colorado River valleys in southern CA. Nests, roosts, and forages mainly in fresh emergent wetland. Also feeds along shorelines and in open fields. Nests in deep and densely vegetated fresh emergent wetland, often along borders of lakes or ponds. Uncommon winter resident in the Central Valley as much of the breeding population migrates south to winter. Usually nests in large colonies (CWHR 2021).	Yes. See discussion.
Mammals						
<i>Corynorhinus townsendii</i> Townsend's big-eared bat	--	SSC	2	No	Occurs in open, dry habitats with rocky areas for roosting. Day roosts in caves, crevices, mines, and sometimes in buildings and hollow trees that protect them from high temperatures. Night roosts may be more open, such as porches and open buildings. Sensitive to roosting site disturbance. Occurs throughout CA except in the high Sierra Nevada from Shasta to Kern cos., and the northwest corner of CA from Del Norte and western Siskiyou cos. to northern Mendocino Co (CWHR 2021).	No. There is no suitable roosting habitat in the BSA.
<i>Lasiurus blossevilli</i> Western red bat	--	SSC	2	No	Tree bat associated with cottonwoods in riparian areas at elevations below 6,500 ft. Favors roosts where leaves form a dense canopy and branches do not obstruct their flyway. May roost in orchards, especially in the Sacramento Valley. Typically feeds along forest edges, in small clearings, and around streetlights where they hunt moths (BCI 2020). Day roosts are typically in edge habitats adjacent to streams or open fields, in orchards, and sometimes urban areas. Occasionally uses caves. Roost sites are generally hidden from view from all directions except below; lack obstruction beneath, allowing the bat to drop downward for flight; lack lower perches that would allow visibility by predators; have dark ground cover to minimize solar reflection; and have nearby vegetation to reduce wind and dust (WBWG 2020).	No. There is no suitable roosting habitat in the BSA.
<i>Nyctinomops macrotis</i> Big free-tailed bat	--	SSC	2	No	Prefers rugged, rocky terrain. Roosts in crevices in high cliffs and rock outcrops, often foraging over water sources. Rare in CA; records of the species are from urban areas of San Diego Co. and vagrants found in fall and winter. A probable vagrant was collected in Alameda Co (CWHR 2021).	No. There is no suitable roosting habitat in BSA.

Special-Status Species/ Common Name	Federal Status ^a	State Status ^{ab}	Source ^c	Solano HCP ^d	Habitat Requirements	Potential to Occur within the Study Area?
<i>Reithrodontomys raviventris</i> Salt-marsh harvest mouse	E	E, FP	1,2	Yes	Found only in saline emergent wetlands of San Francisco Bay and its tributaries. Prefers pickleweed saline emergent wetland habitat. Grasslands adjacent to pickleweed marsh are used, but only when new grass growth affords suitable cover in spring and summer months (CWHR 2021). In Solano Co, mainly associated with coastal saltmarsh vegetation (SCWA 2012).	Yes. See discussion.
<i>Sorex ornatus sinuosus</i> Suisun shrew	--	SSC	2	No	A small mammalian insectivore that prefers tidal marshes. To avoid high tides, shrews will climb into dense foliage that is above the tidal level. Nearby upland habitat provides critical refugia from flooding. Current distribution appears to be limited to the isolated tidal salt and brackish marshes in San Pablo Bay and Suisun Marsh. Its range is bounded on the west by Tubbs Island in Sonoma Co and on the east by Collinsville in Solano Co (Raabe et al. 2010).	Yes. See discussion.
<i>Taxidea taxus</i> American badger	--	SSC	2	No	Found throughout most of CA except the northern North Coast. Abundant in drier open stages of many shrub, forest, and herbaceous habitats with friable soils. Feeds on fossorial rodents, some reptiles, insects, earthworms, bird eggs, and carrion. Friable soils are required to dig burrows for refugia and rearing young (CWHR 2021).	Yes. See discussion.
Plants / CNPS ^d						
<i>Astragalus tener</i> var. <i>ferrisiae</i> Ferris' milk-vetch	--	--/1B.1	2	Yes	Annual herb found in vernal mesic meadows, seeps and valley and foothill grasslands from 6 to 250 ft. Known from Butte, Colusa, Glenn, Sutter, and Yolo cos. Presumed extirpated from Solano Co. (CNPS 2021a). Blooms March through June (Jepson eFlora 2021); April through May (CNPS 2021a).	Yes. See discussion.
<i>Astragalus tener</i> var. <i>tener</i> Alkali milk-vetch	--	--/1B.2	2	Yes	Annual herb found in alkaline conditions of playas, adobe clay Valley and foothill grassland, and vernal pools from 3 to 197 ft. Known from Alameda, Merced, Napa, Solano, and Yolo cos. Presumed extirpated from Contra Costa, Monterey, San Benito, Santa Clara, San Francisco, San Joaquin, Sonoma and Stanislaus cos. (CNPS 2021a). Blooms March through June (Jepson eFlora 2021; CNPS 2021a).	Yes. See discussion.
<i>Atriplex cordulata</i> var. <i>cordulata</i> Heartscale	--	--/1B.2	2	No	Annual herb found in saline or alkaline conditions of chenopod scrub, meadows and seeps, and sandy Valley and foothill grassland from 0 to 1,837 ft. Known from Alameda, Butte, Contra Costa, Colusa, Fresno, Glenn, Kern, Madera, Merced, Solano, and Tulare cos. Presumed extirpated from San Joaquin, Stanislaus, and Yolo cos. (CNPS 2021a). Blooms April through October (CNPS 2021a); June through July (Jepson eFlora 2021).	Yes. See discussion.
<i>Atriplex depressa</i> Brittlescale	--	--/1B.2	2	No	Annual herb found in alkaline and clay soils of chenopod scrub, meadows and seeps, playas, Valley and foothill grassland, and vernal pools from 3 to 1,050 ft. Known from Alameda, Contra Costa, Colusa, Fresno, Glenn, Kern, Merced, Solano, Stanislaus, Tulare, and Yolo cos. (CNPS 2021a). Blooms April through October (CNPS 2021a); June through October (Jepson eFlora 2021).	Yes. See discussion.

Special-Status Species/ Common Name	Federal Status ^a	State Status _{ab}	Source ^c	Solano HCP ^d	Habitat Requirements	Potential to Occur within the Study Area?
<i>Atriplex persistens</i> Vernal pool smallscale	--	--/1B.2	2	Yes	Annual herb found in alkaline vernal pools from 30 to 380 ft. Known from Colusa, Glenn, Madera, Merced, Solano, Stanislaus, and Tulare cos. Blooms June through October (CNPS 2021a; Jepson eFlora 2021).	Yes. See discussion.
<i>Blepharizonia plumosa</i> Big tarplant	--	--/1B.1	2	No	Annual herb usually found in clay soils on dry slopes in valley and foothill grassland from 100 to 1,660 ft. Known from northwest San Joaquin Valley and eastern San Francisco Bay. Presumed extirpated in Solano Co. Blooms July through November (CNPS 2021a, Jepson 2020).	Yes. See discussion
<i>Carex lyngbyei</i> Lyngbye's sedge	--	--/2B.2	2	No	Perennial rhizomatous herb found in brackish and freshwater marshes and swamps from 0 to 35 ft. Known from Del Norte, Humboldt, Marin, Mendocino, Napa, and Solano cos. Blooms/fruits April through August (CNPS 2021a); May through July (Jepson eFlora 2021).	Yes. See discussion
<i>Centromadia parryi</i> ssp. <i>congdonii</i> Congdon's tarplant	--	--/1B.1	2	No	An annual herb found in valley and foothill grasslands from 3 to 754 ft. Known from central western CA. Presumed extirpated from Santa Cruz and Solano cos. Blooms May through November (CNPS 2021a); June through October (Jepson eFlora 2021).	Yes. See discussion.
<i>Centromadia parryi</i> ssp. <i>parryi</i> Pappose tarplant	--	--/1B.2	2	No	Annual herb often found in alkaline conditions of chaparral, coastal prairie, meadows and seeps, coastal salt marshes and swamps, and vernal mesic valley and foothill grasslands from 7 to 1,400 ft. Known from Butte, Colusa, Glenn, Lake, Napa, San Mateo, Solano, Sonoma and Yolo cos. Blooms May through November (CNPS 2021a); June through October (Jepson eFlora 2021).	Yes. This species occurs in the BSA. See discussion
<i>Chloropyron molle</i> ssp. <i>hispidum</i> Hispid salty bird's-beak	--	--/1B.1	2	No	Annual hemiparasitic herb found in alkaline conditions of meadows and seeps, playas, and valley and foothill grasslands from 3 to 510 ft. Known from Alameda, Fresno, Kern, Merced, Placer, and Solano cos. Blooms June through September (CNPS 2021a); June through July (Jepson eFlora 2021).	Yes. See discussion
<i>Chloropyron molle</i> ssp. <i>molle</i> Soft salty bird's beak	CH, E	R/1B.2	2	Yes	Annual hemiparasitic herb found in coastal salt marshes and swamps from 0 to 10 ft. Known from < 15 occurrences in Contra Costa, Marin, Napa, Sacramento, Solano, and Sonoma cos. Blooms July through November (CNPS 2021a; Jepson eFlora 2021).	Yes. See discussion. The BSA is not within designated critical habitat for this species.
<i>Cicuta maculata</i> var. <i>bolanderi</i> Bolander's water-hemlock	--	--/2B.1	2	No	Perennial herb found in coastal, fresh or brackish water marshes and swamps from 0 to 656 ft. Known from Contra Costa, Marin, Sacramento, and Solano cos. Presumed extirpated from Santa Barbara Co. Blooms July through September (CNPS 2021a; Jepson eFlora 2021).	Yes. See discussion.
<i>Cirsium hydrophilum</i> var. <i>hydrophilum</i> Suisun thistle	CH, E	--/1B.1	2	Yes	Perennial herb found in salt marshes and swamps from 0 to 3 ft. Known from 2 occurrences in the Suisun Marsh in Solano Co. Blooms June through September (CNPS 2021a; Jepson eFlora 2021).	Yes. See discussion. The BSA is not within designated critical habitat for this species.
<i>Cryptantha hooveri</i> Hoover's cryptantha	--	--/1A	2	No	Annual herb found in inland dunes and sandy valley and foothill grasslands from 30 to 492 ft. Blooms April through May (CNPS 2021a); March through May (Jepson eFlora 2021).	No. There are no dunes or sandy habitat suitable for this species in the BSA.

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<i>Delphinium recurvatum</i> Recurved larkspur	--	--/1B.2	2	No	Perennial herb found in alkaline chenopod scrub, cismontane woodland, and valley and foothill grassland from 10 to 2,450 ft. Known from Alameda, Butte, Contra Costa, Colusa, Fresno, Glenn, Kings, Kern, Madera, Merced, Monterey, San Joaquin, San Luis Obispo, Solano, and Tulare cos. Blooms March through June (CNPS 2021a; Jepson eFlora 2021). Grows in poorly drained, fine, alkaline soils (Hickman 1993).	Yes. See discussion.
<i>Downingia pusilla</i> Dwarf downingia	--	--/2B.2	2	No	Annual herb found in mesic valley and foothill grasslands and vernal pools from 3 to 1,450 ft. Known from Amador, Fresno, Merced, Napa, Placer, Sacramento, San Joaquin, Solano, Sonoma, Stanislaus, Tehama, and Yuba cos. Blooms from March through May (CNPS 2021a; Jepson eFlora 2021).	Yes. See discussion.
<i>Eriogonum nudum</i> var. <i>psychicola</i> Antioch dunes buckwheat	--	--/1B.1	2	No	Perennial herb found on inland dunes from 0 to 100 ft. Known only from a single occurrence in the Antioch Dunes in Contra Costa Co. Blooms July through October (CNPS 2021a); June through October (Jepson eFlora 2021).	No. There are no dunes or sandy habitat suitable for this species in the BSA.
<i>Eriogonum truncatum</i> Mt. diablo buckwheat	--	--/1B.1	2	No	Annual herb found on sandy soils in chaparral, coastal scrub, and valley and foothill grasslands from 1 to 1,150 ft. Known from one extant occurrence in Mount Diablo State Park. Blooms April through December (CNPS 2021a); April through August (Jepson eFlora 2021).	No. There are no dunes or sandy habitat suitable for this species in the BSA.
<i>Eryngium jepsonii</i> Jepson's coyote-thistle	--	--/1B.2	2	No	Perennial herb found in clay soils in valley and foothill grassland and vernal pools from 10 to 985 ft. Known from Alameda, Contra Costa, Napa, San Mateo, Solano, and Yolo cos. Blooms April through August (CNPS 2021a; Jepson eFlora 2021).	Yes. See discussion.
<i>Erysimum capitatum</i> var. <i>capitatum</i> Contra Costa wallflower	CH, E	E/1B.1	2	No	A perennial herb found in inland dunes from 10 to 66 ft. Known only from the Antioch Dunes in Contra Costa County. Blooms March through July (CNPS 2021a); March through September (Jepson eFlora 2021).	No. There are no dunes or sandy habitat suitable for this species in the BSA. The BSA is not within designated critical habitat for this species.
<i>Eschscholzia rhombipetala</i> Diamond-petaled California poppy	--	--/1B.1		No	Annual herb found in alkaline and clay soils of valley and foothill grassland from 0 to 3,200 ft. Known from Alameda, San Joaquin, and San Luis Obispo cos. Occurrences in Colusa, Contra Costa, and Stanislaus cos. presumed extirpated. Blooms March through April (CNPS 2021a; Jepson eFlora 2021).	Yes. See discussion.
<i>Extriplex joaquinana</i> San Joaquin spearscale	--	--/1B.2	2	No	Annual herb found in alkaline soils in chenopod scrub, meadows and seeps, playas, and Valley and foothill grassland from 3 to 2,740 ft. Known from Alameda, Contra Costa, Colusa, Fresno, Glenn, Merced, Monterey, Napa, San Benito, Solano, Yolo and possibly San Luis Obispo cos. Presumed extirpated in Santa Clara, San Joaquin, and Tulare cos. (CNPS 2021a). Blooms April through September (Jepson eFlora 2021); April through October (CNPS 2021a).	Yes. See discussion.

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<i>Fritillaria liliacea</i> Fragrant fritillary	--	--/1B.2	2	No	Perennial bulbiferous herb found in serpentine, cismontane woodland, coastal prairie, coastal scrub, valley and foothill grasslands from 10 to 1,345 ft. Known from Alameda, Contra Costa, Monterey, Marin, San Benito, Santa Clara, San Francisco, San Mateo, Solano, and Sonoma cos. Blooms February to April (CNPS 2021a; Jepson eFlora 2021).	No. There are no suitable soils in the BSA.
<i>Fritillaria pluriflora</i> Adobe-lily	--	--/1B.2	2	No	Perennial bulbiferous herb found in adobe or serpentine soils of chaparral, cismontane woodland, and valley and foothill grasslands from 109 to 2,313 ft. Known from Butte, Colusa, Glenn, Lake, Napa, Solano, Tehama, and Yolo cos. Blooms February to April (Jepson eFlora 2021; CNPS 2021a).	No. There are no suitable soils in the BSA. The BSA is outside the elevation range.
<i>Gilia capitata</i> ssp. <i>tomentosa</i> Woolly-headed gilia	--	--/1B.1	2	No	Annual herb found in serpentine, rocky outcrops, coastal bluff scrub, and valley and foothill grassland from 33 to 722 ft. Known from Marin and Sonoma cos. Blooms from May to July (CNPS 2021a; Jepson eFlora 2021).	No. There are no suitable soils in the BSA.
<i>Gratiola heterosepala</i> Boggs lake hedge-hyssop	--	E/1B.2	2	Yes	Annual herb found in clay, lake margin marshes and swamps, and vernal pools from 30 to 7,790 ft. Known from Fresno, Lake, Lassen, Madera, Mendocino, Merced, Modoc, Placer, Sacramento, Shasta, Siskiyou, San Joaquin, Solano, Sonoma, and Tehama cos. Blooms from April through August (CNPS 2021a); April through September (Jepson eFlora 2021).	Yes. See discussion.
<i>Hesperervax caulescens</i> Hogwallow starfish	--	--/4.2	3	No	Annual herb found in mesic clay substrates in valley and foothill grassland and in shallow vernal pools, sometimes in high alkaline areas, from 0 to 1,655 ft. Known from Alameda, Butte, Colusa, Contra Costa, Fresno, Glenn, Kern, Mariposa, Merced, Monterey, Sacramento, San Joaquin, San Luis Obispo, Solano, Sonoma, Stanislaus, Sutter, Tehama, Tuolumne, Yolo, Yuba, and possibly San Diego cos. Blooms March through June (CNPS 2021a; Jepson eFlora 2021).	Yes. See discussion.
<i>Hibiscus lasiocarpus</i> var. <i>occidentalis</i> Woolly rose-mallow	--	--/1B.2	2	No	Perennial rhizomatous herb found in freshwater marshes and swamps from 0 to 394 ft. Often found on riverbanks, low peat islands in sloughs, or in riprap on sides of levees. Known from Butte, Contra Costa, Colusa, Glenn, Sacramento, San Joaquin, Solano, Sutter, and Yolo cos. (CNPS 2021a). Blooms June through September (CNPS 2021a); July through November (Jepson eFlora 2021).	Yes. See discussion.
<i>Isocoma arguta</i> Carquinez goldenbush	--	--/1B.1	2	No	Perennial shrub found in alkaline soils of valley and foothill grassland from sea level to 70 ft. Known from Solano Co. Blooms August through December (CNPS 2021a; Jepson eFlora 2021).	Yes. See discussion.
<i>Lasthenia chrysantha</i> Alkali-sink goldfields	--	--/1B.1	2	No	Annual herb found in alkaline vernal pools and wet saline flats from sea level to 655 ft. Known from Fresno, Kern, Kings, Madera, Merced, Sacramento, Solano, Stanislaus, and Tulare cos. Blooms February through April (CNPS 2021a; Jepson eFlora 2021).	Yes. See discussion.

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<i>Lasthenia conjugens</i> Contra Costa goldfields	CH, E	--/1B.1	2	Yes	Annual herb found in mesic habitats of cismontane woodland, alkaline playas, valley and foothill grassland, vernal pools from 0 to 1,540 ft. Known from Alameda, Contra Costa, Mendocino, Monterey, Marin, Napa, Santa Barbara, Santa Clara, Solano, and Sonoma cos. Blooms March through June (CNPS 2021a; Jepson eFlora 2021).	Yes. See discussion. The BSA is within designated critical habitat for this species.
<i>Lasthenia ferrisiae</i> Ferris' goldfields	--	--/4.2	3	No	Annual herb found in alkaline, clay substrates in vernal pools from 65 to 2,295 ft. Known from Alameda, Butte, Colusa, Contra Costa, Fresno, Kern, Kings, Merced, Monterey, Sacramento, San Joaquin, San Luis Obispo, Solano, Stanislaus, Tulare, and Yolo cos. Blooms February through May (CNPS 2021a; Jepson eFlora 2021).	Yes. See discussion.
<i>Lasthenia glabrata</i> ssp. <i>coulteri</i> Coulter's goldfields	--	--/1B.1	2	No	Annual herb found in coastal salt marshes and swamps, playas, and vernal pools from 1 to 4,002 ft. Known from Colusa, Merced, Orange, Riverside, Santa Barbara, San Diego, San Luis Obispo, Santa Rosa Island, Tehama, Ventura, and Yolo cos. May also occur in Tulare Co., where distribution or identity is uncertain. Presumed extirpated in Kern, Los Angeles, and San Bernardino cos. Blooms February through June (CNPS 2021a); April through May (Jepson eFlora 2021). Habitat also described as "saline places, vernal pools" (Jepson eFlora 2021).	Yes. See discussion.
<i>Lathyrus jepsonii</i> var. <i>jepsonii</i> Delta tule pea	--	--/1B.2	2	No	Perennial herb found in freshwater and brackish marshes and swamps from 0 to 13 ft. Known from Alameda, Contra Costa, Napa, Sacramento, Santa Clara, San Joaquin, Solano, and Sonoma cos. Most populations are small. Blooms May through September (CNPS 2021a); April through August (Jepson eFlora 2021).	Yes. See discussion.
<i>Legenere limosa</i> Legenere	--	--/1B.1	2	Yes	Annual herb found in vernal pools from 3 to 2,880 ft. Known from Alameda, Lake, Monterey, Napa, Placer, Sacramento, Santa Clara, Shasta, San Joaquin, San Mateo, Solano, Sonoma, Stanislaus, Tehama, and Yuba cos. Presumed extirpated from Stanislaus Co. Blooms from April through June (CNPS 2021a); May through June (Jepson eFlora 2021).	Yes. See discussion.
<i>Lepidium latipes</i> var. <i>heckardii</i> Heckard's pepper-grass	--	--/1B.2	2	No	Annual herb found in valley and foothill grassland (alkaline flats) from 6 to 650 ft. Known from Glenn, Merced, Sacramento, Solano, and Yolo cos. (CNPS 2021a). Blooms from March through May (CNPS 2021a); March through June (Jepson eFlora 2021).	Yes. See discussion.
<i>Lilaeopsis masonii</i> Mason's lilaeopsis	--	R/1B.1	2	Yes	Perennial rhizomatous herb found in brackish or freshwater marshes and swamps, and riparian scrub from 0 to 30 ft. Occurs in tidal habitats. Known from Alameda, Contra Costa, Marin, Napa, Sacramento, San Joaquin, Solano, and Yolo cos. Blooms from April through November (CNPS 2021a); June through August (Jepson eFlora 2021).	No. There is no tidally influenced habitat in the BSA.

Special-Status Species/ Common Name	Federal Status ^a	State Status ^{ab}	Source ^c	Solano HCP ^d	Habitat Requirements	Potential to Occur within the Study Area?
<i>Limosella australis</i> Delta mudwort	--	--/2B.1	2	No	Stoloniferous herb typically found on mud banks of marshes, swamps, and riparian scrub from 0 to 10 ft. In CA, known only from the tidally influenced portions of the lower Sacramento-San Joaquin Delta in Contra Costa, Sacramento, San Joaquin, and Solano cos. Native status in CA is debated. Treated as naturalized in the first and second editions of the Jepson Manual (Hickman 1993, Baldwin et al. 2012). Blooms May through August (CNPS 2021a; Jepson eFlora 2021).	No. There is no tidally influenced habitat in the BSA.
<i>Madia radiata</i> Showy golden madia	--	--/1B.1	2	No	An annual herb found in cismontane woodland valleys and foothill grasslands from 82 to 2,952 ft. Blooms March through May (CNPS 2021a; Jepson eFlora 2021).	Yes. See discussion.
<i>Microseris paludosa</i> Marsh microseris	--	--/1B.2	2	No	Perennial herb found in closed-cone coniferous forest, cismontane woodland, coastal scrub, and moist Valley and foothill grassland from 10 to 1,000 ft. Known from Mendocino, Monterey, Marin, San Benito, Santa Cruz, San Luis Obispo, Solano and Sonoma cos. Presumed extirpated elsewhere. Blooms April through July (Baldwin et al. 2012; CNPS 2021a); April through June (Jepson eFlora 2021). Hayes and Taylor (2006) describe habitat as vernal moist to saturated sites in coastal terrace prairie along the coast.	Yes. See discussion.
<i>Navarretia leucocephala</i> ssp. <i>bakeri</i> Baker's navarretia	--	--/1B.1	2	No	Annual herb found in mesic habitats of cismontane woodland, lower montane coniferous forest, meadows and seeps, valley and foothill grassland, and vernal pools from 15 to 5,700 ft. Known from the high Cascade Range, Klamath Ranges, north Coast Ranges, Sacramento Valley, and Bay Area. Blooms April through July (CNPS 2021a; Jepson eFlora 2021).	Yes. See discussion.
<i>Neostapfia colusana</i> Colusa grass	CH, T	E/1B.1	2	Yes	Annual herb found in large adobe vernal pools from 15 to 660 ft. Known from Glenn, Merced, Solano, Stanislaus, and Yolo cos. Presumed extirpated from Colusa Co. Blooms May through August (CNPS 2021a; Jepson eFlora 2021). Members of the Orcuttieae tribe inhabit large vernal pools or playas with inundation lasting until May or June, in areas of the pools where other plants are almost entirely absent. In the Sacramento Valley Colusa grass is known from the rim of alkaline basins (USFWS 2005a).	Yes. See discussion. The BSA is not within designated critical habitat for this species.
<i>Oenothera deltooides</i> ssp. <i>howellii</i> Antioch dunes evening- primrose	CH, E	E/1B.1	2	No	Perennial herb found in inland dunes from 0 to 100 ft. Known from Sacramento and Contra Costa cos. Known from three native occurrences. Blooms March to September (CNPS 2021a; Jepson eFlora 2021).	No. There are no dunes or sandy habitat suitable for this species in the BSA. The BSA is not within designated critical habitat for this species.

Special-Status Species/ Common Name	Federal Status ^a	State Status ^{ab}	Source ^c	Solano HCP ^d	Habitat Requirements	Potential to Occur within the Study Area?
<i>Orcuttia inaequalis</i> San Joaquin Valley Orcutt grass	CH, T	E/1B.1	2	Yes	Annual herb found in vernal pools from 30 to 2,475 ft. Known from Fresno, Madera, Merced, Solano, and Tulare cos. Presumed Extirpated in Stanislaus co. Blooms April through September (CNPS 2021a; Jepson eFlora 2021). Members of the Orcuttieae tribe inhabit large vernal pools or playas with inundation lasting until May or June, in areas of the pools where other plants are almost entirely absent. Nearly all occurrences of San Joaquin Valley Orcutt grass are on the east side of the San Joaquin Valley (USFWS 2005a).	Yes. See discussion. The BSA is not within designated critical habitat for this species.
<i>Plagiobothrys hystriculus</i> Bearded popcorn flower	--	--/1B.1	2	No	Annual herb found in mesic valley and foothill grassland and vernal pools and swales from 0 to 900 ft. Known only from Solano Co, primarily in the Montezuma Hills. Blooms April through May (CNPS 2021a); March through May (Jepson eFlora 2021).	Yes. See discussion.
<i>Puccinellia simplex</i> California alkali grass	--	--/1B.2	2	No	Annual herb found in alkaline, vernal mesic sinks, flats, and lake margins within chenopod scrub, meadows and seeps, valley and foothill grassland, and vernal pools from 7 to 3,051 ft. Known from Alameda, Butte, Contra Costa, Colusa, Fresno, Glenn, Kern, Lake, Los Angeles, Madera, Merced, Napa, San Bernardino, Santa Clara, Santa Cruz, San Luis Obispo, Solano, Stanislaus, Tulare, and Yolo cos. Presumed extirpated from Kings Co (CNPS 2021a). Blooms March through May (Jepson eFlora 2021; CNPS 2021a).	Yes. See discussion.
<i>Sidalcea keckii</i> Keck's checkerbloom	CH, E	--/1B.1	2	No	Annual herb found in serpentine, clay substrates of cismontane woodland and valley and foothill grassland from 250 to 2,150 ft. Known from, Fresno, Merced, and Tulare cos. Possibly extirpated from Colusa Napa, Solano, and Yolo cos. Blooms April through May (Jepson eFlora 2021; CNPS 2021a).	No. The BSA is outside this species' range. There are no suitable soils in the BSA. The BSA is not within designated critical habitat for this species.
<i>Spergularia macrotheca</i> var. <i>longistyla</i> Long-styled sand-spurrey	--	--/1B.2	2	No	Perennial herb found in alkaline marshes, mud flats, meadows, and hot springs below 650 ft. Known from the inner north Coast Range and Great Valley. Blooms in spring (Jepson 2020); February through May (CNPS 2021a).	Yes. See discussion.
<i>Stuckenia filiformis</i> ssp. <i>alpina</i> Slender-leaved pondweed	--	--/2B.2	2	No	Perennial rhizomatous aquatic herb found in assorted shallow freshwater marshes and swamps from 950 to 7,100 ft. Known from the Klamath Ranges, central high Sierra Nevada, Great Valley, Central Coast, Bay Area, and Great Basin. Blooms May through July (CNPS 2021a; Jepson eFlora 2021).	Yes. See discussion.
<i>Symphotrichum lentum</i> (= <i>Aster lentus</i>) Suisun Marsh aster	--	--/1B.2	2	No	Perennial rhizomatous herb found in brackish and freshwater marshes and swamps from 0 to 10 ft. Known from Contra Costa, Napa, Sacramento, San Joaquin, Solano, and Yolo cos. (CNPS 2021a). Blooms April through November (CNPS 2021a); May through November (Jepson eFlora 2021).	Yes. See discussion.

Special-Status Species/ Common Name	Federal Status ^a	State Status ^{ab}	Source ^c	Solano HCP ^d	Habitat Requirements	Potential to Occur within the Study Area?
<i>Trifolium amoenum</i> Showy rancheria clover, two- forked clover	E	--/1B.1	2	No	Annual herb found in coastal bluff scrub and sometimes on serpentinite soils in valley and foothill grassland from 15 to 1,360 ft. Known from Marin, San Mateo, and Sonoma cos. Presumed extirpated from Napa, Santa Clara, and Solano cos. Blooms April through June (CNPS 2021a; Jepson eFlora 2021).	No. The BSA is outside the species' range according to the USFWS profile. This species is presumed extirpated in Solano Co and is not known from highly alkaline habitats.
<i>Trifolium hydrophilum</i> Saline clover	--	--/1B.2	2	No	Annual herb found in marshes and swamps, mesic and alkaline soils of valley and foothill grassland, and vernal pools from 0 to 984 ft. Known from Alameda, Contra Costa, Lake, Monterey, Napa, Sacramento, San Benito, Santa Clara, Santa Cruz, San Joaquin, San Luis Obispo, San Mateo, Solano, Sonoma, and Yolo cos., and potentially from Colusa Co. (CNPS 2021a). Blooms April through June (Jepson eFlora 2021; CNPS 2021a).	Yes. This species occurs in the BSA. See discussion.
<i>Tuctoria mucronata</i> Solano grass	CH, E	E/1B.1	2		Annual herb found in mesic soils and vernal pools in valley and foothill grassland from 16 to 32 ft. Blooms from April through August (CNPS 2021a; Jepson eFlora 2021). Known from only three occurrences: one at Olcott Lake at Jepson Prairie Preserve, one nearby on private land, and one south of Davis on federal land (CNPS 2021a). Members of the Orcuttieae tribe inhabit large vernal pools or playas with inundation lasting until May or June, in areas of the pools where other plants are almost entirely absent. Solano grass is known only from alkaline soils of the Pescadero series (USFWS 2005a).	Yes. See discussion. The BSA is not within designated critical habitat for this species.
<i>Viburnum ellipticum</i> Oval-leaved viburnum	--	--/2B.3	2		Deciduous shrub found in chaparral, cismontane woodland, and lower montane coniferous forest from 700 to 4,600 ft. Known from Alameda, Contra Costa, El Dorado, Fresno, Glenn, Humboldt, Lake, Mendocino, Mariposa, Napa, Placer, Shasta, Solano, Sonoma, and Tehama cos. Blooms May through August (Baldwin et al. 2012, CNPS 2021a); June through August (Jepson eFlora 2021).	No. The BSA is outside the elevation range and soils are unlikely to be suitable for this species.
Natural Communities						
Coastal Brackish Marsh	--	--/ --	2	--	A permanently or frequently inundated marsh dominated by perennial emergent herbaceous hydrophytic halophytes that form dense cover up to about 5 ft tall. Greater freshwater influence than salt marshes. Salinity varies with tide level and extent of freshwater runoff. Characteristic species include: <i>Carex</i> spp., <i>Distichlis spicata</i> , <i>Juncus</i> spp., <i>Salicornia</i> spp., <i>Scirpus</i> spp., <i>Schoenoplectus</i> sp., and <i>Typha latifolia</i> . Typically found at interior edges of coastal bays and estuaries or in lagoons. Found most extensively around Suisun Bay at the mouth of the Sacramento-San Joaquin Delta (Holland 1986).	Yes. This community occurs in the southeast corner of the BSA. See discussion.

Special-Status Species/ Common Name	Federal Status ^a	State Status ^{ab}	Source ^c	Solano HCP ^d	Habitat Requirements	Potential to Occur within the Study Area?
Coastal and Valley Freshwater Marsh	--	--/ --	2	--	A permanently flooded freshwater marsh dominated by emergent perennial monocots 13-16 ft tall. Often lacks a significant current that allows deep, peaty soils to accumulate. Characteristic species include <i>Carex</i> sp., <i>Eleocharis</i> sp., <i>Scirpus</i> sp., <i>Schoenoplectus</i> sp., <i>Typha</i> sp., and <i>Verbena bonariensis</i> . Most extensive in the upper portion of the Sacramento-San Joaquin River Delta. Commonly occurs in the Sacramento and San Joaquin valleys in river oxbows and other flood plain areas (Holland 1986).	No. This community does not occur in the BSA.
Northern Claypan Vernal Pool	--	--/ --	2	--	A low, herbaceous, wetland emergent community dominated by annual herbs and grasses. Pools may be small or quite large. On fairly old, circum-neutral to alkaline, silica-cemented hardpan soils. Often saline. Intergrades with cismontane swale and cismontane alkali marsh, which has water present throughout the year. Loses water primarily by evaporation. Typical species include <i>Epilobium campestre</i> , <i>Cressa truxillensis</i> , <i>Downingia</i> spp., <i>Eryngium aristulatum</i> , <i>Lasthenia</i> spp., <i>Plagiobothrys</i> spp., and <i>Spergularia marina</i> (Holland 1986).	No. No hardpans were observed in the BSA in numerous soil pits excavated during delineation fieldwork. Vernal pool plant species were absent or uncommon in the seasonal wetlands.
Interior Stabilized Dunes	--	--/ --	2	--	An open, primarily perennial, winter and spring growing community with scattered low shrubs or <i>Quercus agrifolia</i> . Shrubs are usually shorter than waist-height and provide only 10% cover. A riverbank community on the lower reaches of the San Joaquin River just above its confluence with the Sacramento River. Narrowly restricted to the mouth of the Sacramento-San Joaquin Delta, and further reduced by agriculture and sand quarrying (Holland 1986).	No. This community does not occur in the BSA.
Valley Needlegrass Grassland	--	--/--	2	--	Grassland dominated by the perennial tussock-forming bunchgrass <i>Stipa</i> (= <i>Nassella</i>) <i>pulchra</i> with annuals occurring between bunches. Usually on fine-textured (often clay) soils, moist or waterlogged in winter, but very dry in summer. Historically occurred in Sacramento, San Joaquin, and Salinas valleys, as well as the Los Angeles Basin. Present range greatly reduced (Holland 1986).	No. This community does not occur in the BSA.

^a **Listing Status** Codes used in table are:

E = Endangered; T = Threatened; P = Proposed; C = Candidate; R = California Rare

^b **Other Codes** Codes used in table are as follows:

SC = CDFW Species of Special Concern; FP = CDFW Fully Protected; Prot = CDFW Protected; CH = Critical habitat designated.

CNPS California Rare Plant Rank (plants only): 1A = Presumed Extinct in CA; 1B = Rare or Endangered (R/E) in CA and elsewhere; 2 = R/E in CA and more common elsewhere; 3 = Need more information; 4 = Plants of limited distribution

CNPS Rank Decimal Extensions: .1 = Seriously endangered in California (over 80% of occurrences threatened / high degree and immediacy of threat); .2 = Fairly endangered in CA (20-80% of occurrences threatened); .3 = Not very endangered in CA (< 20% of occurrences threatened or no current threats known).

^c **Sources** 1 = From USFWS or NMFS species lists. 2 = From CNDDDB and/or CNPS database queries. 3 = Observed or included by SWCA biologists, or from the Draft Solano HCP.

^d **Solano Multispecies HCP** Yes = Species is a Draft Solano HCP Covered Species. No = Species is not a Solano HCP Covered Species.

APPENDIX C.

Plant and Wildlife Species Observed

Plant Species Observed.

Family	Scientific Name ¹	Common Name	N/I ²	Cal-IPC ³
EU DICOTS				
Apiaceae	<i>Conium maculatum</i>	Poison hemlock	I	Moderate
	<i>Eryngium aristulatum</i> var. <i>aristulatum</i>	Eryngium	N	
	<i>Lomatium utriculatum</i>	Lomatium	N	
	<i>Foeniculum vulgare</i>	Fennel	I	High
Apocynaceae	<i>Asclepias fascicularis</i>	Narrow-leaf milkweed	N	
Asteraceae	<i>Achyrachaena mollis</i>	Blow-wives	N	
	<i>Carduus pycnocephalus</i> ssp. <i>pycnocephalus</i>	Italian thistle	I	Moderate
	<i>Centaurea calcitrapa</i>	Purple star-thistle	I	Moderate
	<i>Centaurea solstitialis</i>	Yellow star-thistle	I	High
	<i>Centromadia parryi</i> ssp. <i>parryi</i>	Pappose tarplant	N	
	<i>Cichorium intybus</i>	Chicory	I	
	<i>Cotula coronopifolia</i>	Brass-buttons	I	Limited
	<i>Dittrichia graveolens</i>	Stinkwort	I	Moderate
	<i>Grindelia camporum</i>	Gumplant	N	
	<i>Helminthotheca echioides</i>	Bristly ox-tongue	I	Limited
	<i>Hemizonia congesta</i> ssp. <i>luzulifolia</i>	Hayfield tarweed	N	
	<i>Hypochaeris glabra</i>	Smooth cat's-ear	I	Limited
	<i>Lactuca serriola</i>	Lettuce	I	
	<i>Lasthenia fremontii</i>	Fremont's goldfields	N	
	<i>Lasthenia glaberrima</i>	Smooth goldfields	N	
	<i>Layia fremontii</i>	Layia	N	
	<i>Psilocarphus oregonus</i>	Oregon woollyheads	N	
	<i>Psilocarphus tenellus</i>	Slender woolly-marbles	N	
	<i>Senecio vulgaris</i>	Common groundsel	I	
	<i>Sonchus oleraceus</i>	Common sow thistle	I	
	<i>Symphotrichum chilense</i>	American-aster	N	
	<i>Tragopogon</i> sp.	Goat's beard, salsify	I	
	<i>Xanthium strumarium</i>	Cocklebur	N	
Betulaceae	<i>Alnus rhombifolia</i>	White alder	N	
Boraginaceae	<i>Amsinckia</i> sp.	Fiddleneck	N	
	<i>Plagiobothrys greenei</i>	Greene's spiny-nut popcorn flower	N	
	<i>Plagiobothrys stipitatus</i> var. <i>micranthus</i>	Great Valley popcornflower	N	
Brassicaceae	<i>Brassica rapa</i>	Turnip, field mustard	I	Limited
	<i>Capsella bursa-pastoris</i>	Shepherd's purse	I	
	<i>Lepidium latifolium</i>	Perennial pepperweed	I	High
	<i>Hirschfeldia incana</i>	Summer mustard	I	Moderate
	<i>Raphanus sativus</i>	Radish	I	Limited
Campanulaceae	<i>Downingia concolor</i> var. <i>concolor</i>	Downingia	N	
Caryophyllaceae	<i>Cerastium glomeratum</i>	Sticky mouse-ear chickweed	I	
	<i>Spergularia macrotheca</i> var. <i>leucantha</i>	Sticky sand-spurrey	N	
	<i>Stellaria media</i>	Common chickweed	I	
Chenopodiaceae	<i>Atriplex prostrata</i>	Fat-hen	I	
	<i>Salicornia depressa</i>	Pickleweed	N	
	<i>Salicornia pacifica</i>	Pickleweed	N	
Convolvulaceae	<i>Convolvulus arvensis</i>	Bindweed, orchard morning-glory	I	
	<i>Cressa truxillensis</i>	Alkali weed	N	

Family	Scientific Name ¹	Common Name	N/I ²	Cal-IPC ³
Fabaceae	<i>Lotus corniculatus</i>	Bird's-foot trefoil	I	
	<i>Lupinus bicolor</i>	Miniature lupine	N	
	<i>Medicago polymorpha</i>	California burclover	I	Limited
	<i>Melilotus indicus</i>	Sourclover	I	
	<i>Trifolium depauperatum</i> var. <i>depauperatum</i>	Dwarf sack clover	N	
	<i>Trifolium dubium</i>	Little hop clover	I	
	<i>Trifolium glomeratum</i>	Clustered clover	I	
	<i>Trifolium hirtum</i>	Rose clover	I	Limited
	<i>Trifolium hydrophilum</i>	Saline clover	N	
	<i>Trifolium repens</i>	White clover	I	
	<i>Trifolium subterraneum</i>	Subterranean clover	I	
	<i>Trifolium tomentosum</i>	Woolly clover	I	
	<i>Trifolium variegatum</i> var. <i>major</i>	Large variegated clover	N	
	<i>Vicia sativa</i>	Vetch	I	
	<i>Vicia villosa</i>	Hairy vetch, winter vetch	I	
Frankeniaceae	<i>Frankenia salina</i>	Alkali heath	N	
Geraniaceae	<i>Erodium botrys</i>	Storksbill, filaree	I	
	<i>Erodium moschatum</i>	Greenstem filaree	I	
	<i>Geranium molle</i>	Cranesbill, geranium	I	
	<i>Geranium</i> sp.	Cranesbill, geranium	--	
Lythraceae	<i>Lythrum hyssopifolia</i>	Loosestrife	I	Limited
Malvaceae	<i>Malva</i> sp.	Mallow	--	
	<i>Malvella leprosa</i>	Alkali-mallow, white-weed	N	
	<i>Sidalcea malviflora</i> ssp. <i>laciniata</i>	Geranium-leaved checkerbloom	N	
Oleaceae	<i>Fraxinus</i> sp.	Ash	N	
Onagraceae	<i>Epilobium densiflorum</i>	Willowherb	N	
	<i>Ludwigia hexapetala</i>	Uruguayan primrose-willow	I	High
Orobanchaceae	<i>Castilleja attenuata</i>	Valley tassels	N	
	<i>Parentucellia viscosa</i>	Parentucellia	I	Limited
	<i>Triphysaria eriantha</i>	Butter-and-eggs	N	
Plantaginaceae	<i>Plantago lanceolata</i>	English plantain	I	
Polygonaceae	<i>Persicaria</i> sp.	Smartweed	--	
	<i>Polygonum aviculare</i> ssp. <i>depressum</i>	Knotweed	I	
	<i>Rumex crispus</i>	Curly dock	I	Limited
	<i>Rumex pulcher</i>	Fiddle dock	I	
Ranunculaceae	<i>Ranunculus californicus</i>	Buttercup	N	
	<i>Ranunculus muricatus</i>	Buttercup	I	
	<i>Myosurus</i> sp.	Mousetail	N	
Rubiaceae	<i>Galium aparine</i>	Goose grass	N	
Salicaceae	<i>Populus nigra</i>	Black poplar, Lombardy poplar	I	
MONOCOTS				
Alismataceae	<i>Alisma lanceolatum</i>	Water-plantain	I	
Cyperaceae	<i>Bolboschoenus maritimus</i> ssp. <i>paludosus</i>	Saltmarsh bulrush, alkali bulrush	N	
	<i>Eleocharis macrostachya</i>	Spikerush	N	
	<i>Schoenoplectus acutus</i> var. <i>occidentalis</i>	Common tule	N	
Juncaceae	<i>Juncus balticus</i> ssp. <i>ater</i>	Baltic rush	N	
	<i>Juncus bufonius</i>	Toad rush	N	
	<i>Juncus</i> sp.	Rush	--	
	<i>Juncus xiphioides</i>	Iris-leaved rush	N	

Family	Scientific Name ¹	Common Name	N/I ²	Cal-IPC ³
Poaceae	<i>Avena</i> sp.	Oat	I	
	<i>Briza minor</i>	Annual quaking grass, small quaking grass	I	
	<i>Bromus</i> sp.	Brome, chess	--	
	<i>Bromus diandrus</i>	Ripgut grass	I	Moderate
	<i>Bromus hordeaceus</i>	Soft chess	I	Limited
	<i>Crypsis schoenoides</i>	Swamp prickly grass	I	
	<i>Distichlis spicata</i>	Salt grass	N	
	<i>Elymus caput-medusae</i>	Medusa head	I	High
	<i>Festuca</i> sp.	Fescue, rye grass	--	
	<i>Festuca bromoides</i>	Brome fescue	I	
	<i>Festuca perennis</i>	Rye grass	I	Moderate
	<i>Glyceria</i> sp.	Manna grass	--	
	<i>Hordeum brachyantherum</i>	Barley	N	
	<i>Hordeum marinum</i> ssp. <i>gussoneanum</i>	Mediterranean barley	I	Moderate
	<i>Parapholis incurva</i>	Sickle grass	I	
	<i>Paspalum dilatatum</i>	Dallis grass	I	
	<i>Pleuropogon californicus</i>	Semaphore grass	N	
	<i>Phalaris aquatica</i>	Harding grass	I	
	<i>Poa annua</i>	Annual blue grass	I	
	<i>Stipa pulchra</i>	Purple needle grass	N	
	<i>Triticum aestivum</i>	Wheat	I	
Themidaceae	<i>Brodiaea elegans</i> ssp. <i>elegans</i>	Harvest brodiaea	N	
	<i>Dichelostemma capitatum</i>	Blue dicks	N	
	<i>Muilla maritima</i>	Common muilla	N	
Typhaceae	<i>Typha domingensis</i>	Southern cattail	N	
	<i>Typha latifolia</i>	Broad-leaved cattail	N	

¹ Nomenclature and taxonomy follow *The Jepson manual: Vascular plants of California*, 2nd ed. (Baldwin et al., eds. 2012).

² N = Native to California; I = Introduced.

³ Negative ecological impact ranking by the California Invasive Plant Council (Cal-IPC 2020).

Wildlife Species Observed.

Common Name	Scientific Name
MAMMALS	
Black-tailed jackrabbit	<i>Lepus californicus</i>
Coyote (scat)	<i>Canis latrans</i>
River otter (scat along eastern ditch)	<i>Lontra canadensis</i>
Raccoon (scat)	<i>Procyon lotor</i>
Meadow vole	<i>Microtus pennsylvanicus</i>
BIRDS	
American crow	<i>Corvus brachyrhynchos</i>
American kestrel	<i>Falco sparverius</i>
Barn swallow	<i>Hirundo rustica</i>
Barn owl (carcass along SR 12)	<i>Tyto alba</i>
Black phoebe	<i>Sayornis nigricans</i>
Brewer's blackbird	<i>Euphagus cyanocephalus</i>
California horned lark	<i>Eremophila alpestris actia</i>
Cliff swallow	<i>Hirundo pyrrhonota</i>
Common raven	<i>Corvus corax</i>
Cooper's hawk	<i>Accipiter cooperi</i>
Greater yellowlegs	<i>Tringa melanoleuca</i>
Killdeer	<i>Charadrius vociferus</i>
Loggerhead shrike	<i>Lanius ludovicianus</i>
Mallard	<i>Anas platyrhynchos</i>
Marsh wren	<i>Cistothorus palustris</i>
Northern harrier	<i>Circus cyaneus</i>
Red-tailed hawk	<i>Buteo jamaicensis</i>
Red-winged blackbird	<i>Agelaius phoeniceus</i>
Rock dove	<i>Columbia livia</i>
Ruby-crowned kinglet	<i>Regulus calendula</i>
Savannah sparrow	<i>Passerculus sandwichensis</i>
Say's phoebe	<i>Sayornis saya</i>
Tree swallow	<i>Tachycineta bicolor</i>
Turkey vulture	<i>Cathartes aura</i>
Vireo sp.	<i>Vireonidae</i>
Western meadowlark	<i>Sturnella neglecta</i>
White-tailed kite	<i>Elanus leucurus</i>
Wilson's snipe	<i>Gallinago delicata</i>
Yellow-billed magpie	<i>Pica nuttalli</i>
REPTILES	
Western fence lizard	<i>Sceloporus occidentalis</i>
FISH	
Mosquitofish ¹	<i>Gambusia affinis</i>
INVERTEBRATES	
Crawfish (carcass along eastern ditch)	Family Cambaridae or Astacidae

¹ Numerous schooling fish about 2 inches long were observed in Drainage Ditch 01 in fall 2020 and spring 2021. The fish were likely mosquitofish based on size and body shape.

APPENDIX D.

Photographs



Photo 1. View looking south toward uplands in the dryland farmed portion of the valley floor grassland in the western part of the BSA, from a location near Petersen Road. 08 March 2021.



Photo 2. View looking south toward uplands in the dryland farmed portion of the valley floor grassland in the central portion of the BSA, from a location near Petersen Road. 08 March 2021.



Photo 3. View looking northeast toward the dryland farmed portion of the valley floor grassland in the easternmost portion of the BSA (with harvested wheat in 2020). 19 November 2020.



Photo 4. View north toward valley floor grassland in northwest portion of the BSA. The yellow flowers (white arrow) are Fremont's goldfields (*Lasthenia fremontii*). Italian rye grass and poppase tarplant are abundant. 22 April 2021.



Photo 5. View looking northeast towards a seasonal wetland within a slight depression in the valley floor grassland in the central portion of the BSA. No water is present. 8 March 2021.



Photo 6. View looking east toward uplands in the central-eastern portion of the BSA. A fire burned the southeast corner of the BSA in October 2020 (around wind turbine and beyond). 22 April 2021.



Photo 7. View looking northeast toward freshwater marsh vegetation in DD-01 in the northern portion of the BSA. Common tule (*Schoenoplectus acutus* var. *occidentalis*) dominates this portion of DD-01. One riparian white alder (*Alnus rhombifolia*) tree occurs along the ditch. Water is present in DD-01. 20 July 2021.



Photo 8. View looking south toward freshwater marsh vegetation in DD-01 in the southern portion of the BSA. Uruguayan primrose-willow (*Ludwigia hexapetala*) and rushes (*Juncus* spp.) dominate this portion of DD-01. Two riparian ash (*Fraxinus* sp.) trees in distance. 29 October 2020.



Photo 9. View looking south (downstream) toward seasonal wetland in DD-02 in the southern portion of the BSA. Some standing water is present; no flow was observed. 04 February 2021.



Photo 10. View looking north toward seasonal wetland in DD-02 from the culvert crossing in the central portion of the BSA. No water is present in this portion of the ditch. 08 March 2021.



Photo 11. View looking south toward DD-02 as it leaves the BSA through a culvert beneath SR 12 (visible on far left). Lombardy poplar (*Populus nigra*) occurs along the ditch. 28 October 2020.



Photo 12. View looking west toward DD-03 (roadside ditch) along Peterson Road. The current ditch was excavated in 2015 during widening of Petersen Road. 04 February 2021.



Photo 13. View looking southeast toward inundation in one of the seasonal wetlands along the north side of State Route (SR) 12 in the southern portion of the eastern field. 04 February 2021.



Photo 14. View looking northwest toward inundation in a portion of a seasonal wetland in the southeast portion of the BSA. Road berm supporting SR 12 on left beyond fence. 04 February 2021.



Photo 15. View looking southeast toward inundation in a portion of a seasonal wetland in the southeast portion of the BSA. Road berm supporting SR 12 on right beyond fence. 04 February 2021.



Photo 16. View looking south toward a seasonal wetland (located at white arrow) at the southwest corner of the BSA. The wetland is partly in a tilled firebreak along the fence line. 08 March 2021.



Photo 17. View looking southeast toward inundation in the seasonal wetland in the southern portion of the BSA (the deepest, longest-inundated seasonal wetland in the BSA). SR 12 is just beyond the wetland in background. 04 February 2021.



Photo 18. View looking southeast toward the same seasonal wetland pictured in Photo 17, now dry. Smooth goldfields (*Lasthenia glaberrima*) and saltgrass are abundant along the wetland fringe; alkali weed (*Cressa truxillensis*) predominates in the deeper portions. 22 April 2021.



Photo 19. View looking southeast toward the large seasonal wetland at the southeast corner of the BSA. Nonnative brass buttons (*Cotula coronopifolia*; yellow flowers) are dominant between gentle mounds sparsely vegetated with pickleweed (*Salicornia depressa*). No water is present. 08 March 2021.



Photo 20. View north toward the seasonal wetland just north of SR 12 in the western field. The wetland is dry and dominated by Italian rye grass (*Festuca perennis*) and coyote thistle (*Eryngium aristulatum*). DD-02 occurs just out of view on right, beyond chain-link fence. 22 April 2021.



Photo 21. View northeast toward seasonal wetland (arrow) with alkali heath (*Frankenia salina*), salt grass (*Distichlis spicata*), and a few pickleweed (*Salicornia pacifica*). 08 March 2021.



Photo 22. View southwest toward typical alkali meadow in the eastern portion of the BSA. Saltgrass, alkali heath, Mediterranean barley (*Hordeum marinum*) are dominant. 22 April 2021.



Photo 23. View looking southwest, toward the culvert inlet beneath SR 12. The culvert drains the wetlands in the southeast corner of the BSA. 08 March 2021.



Photo 24. View looking south towards the coastal brackish marsh at the southeast corner of the BSA. Water a couple inches deep is present. 29 October 2020.



Photo 25. Aquatic invertebrate shells and wracking observed in the brackish marsh and seasonal wetland at the southeast corner of the BSA. 08 March 2021.



Photo 26. View northwest towards pappose tarplant (*Centromadia parryi* ssp. *parryi*; CRPR 1B.2) growing in a seasonal wetland in the northeast portion of the BSA. 20 July 2021.



Photo 27. View north toward pappose tarplant plants (green) in the southeast portion of the BSA. The plants are growing in alkali meadow that burned in a grass fire the year prior. 20 July 2021.



Photo 28. Pappose tarplant plants (bright green plant with yellow flowers in foreground and background) growing in the valley floor grassland in the western portion of the BSA. 20 July 2021.



Photo 29. View southwest toward the seasonal wetland at the southeast corner of the BSA where the saline clover (*Trifolium hydrophilum*; CRPR 1B.2) was found. 22 April 2021.



Photo 30. Saline clover plants observed in and along the seasonal wetland in preceding photo. 22 April 2021.

APPENDIX E.

CNPS Vegetation Rapid Assessment Data Forms

CNPS and CDFW Combined Vegetation Rapid Assessment and Relevé Field Form
(Revised February 27, 2014)

For Office Use Final database #:		Final vegetation type: Alliance _____ Association _____	
I. LOCATIONAL/ENVIRONMENTAL DESCRIPTION			
Stand ID: CNPS 1	Date: 8/3/21	Name of recorder: Mike Bower, M.S.	Other surveyors: Monica Cal, B.A.
GPS name: TABLETA Datum: NAD83 OR _____		For Relevé: Bearing°, left axis at SW point _____ of Long / Short side	
UTME _____ UTMN _____		Zone: 10 / 11 (circle one) Error: ± _____ ft / m / pdop	
GPS within stand? <input checked="" type="checkbox"/> Yes / No If No, cite from GPS to stand: distance (m) _____ bearing ° _____ inclination ° _____ and record projected UTM: UTME _____ UTMN _____			
Elevation: 108 ft / m Camera Name/Photograph #'s: MJB N-E-S-W			
Stand Size (acres): <1, 1-5 <input checked="" type="checkbox"/> Plot Size (m²): 10 / 100 / 400 / 1000 Plot Shape _____ x _____ ft / m or Circle Radius 10 ft / m <input checked="" type="checkbox"/>			
Exposure, Actual °: 0 NE NW SE SW <input checked="" type="checkbox"/> Flat Variable All Steepness, Actual °: 0 <input checked="" type="checkbox"/> 0° 1-5° 5-25° >25			
Topography: Macro: top upper mid lower <input checked="" type="checkbox"/> bottom Micro: convex <input checked="" type="checkbox"/> flat concave undulating			
Geology code: CLAK Soil Texture code: MFSL <input checked="" type="checkbox"/> Upland or Wetland/Riparian (circle one)			
% Surface cover: (Incl. outcrops) (>60cm diam) (25-60cm) (7.5-25cm) (2mm-7.5cm) (Incl sand, mud)			
H20: 0 BA Stems: 2 Litter: 10 Bedrock: 0 Boulder: 0 Stone: 0 Cobble: 0 Gravel: 0 Fines: 88 =100%			
% Current year bioturbation 2 Past bioturbation present? <input checked="" type="checkbox"/> Yes / No % Hoof punch 5			
Fire evidence: Yes <input checked="" type="checkbox"/> No (circle one) If yes, describe in Site history section, including date of fire, if known.			
Site history, stand age, comments: Stand in ditched ag field, last ditched in 2020 (1 year ago), grazed by cattle. Hydrology altered by ditches along Peterson road and drainage ditches running N-S through site.			
Disturbance code / Intensity (L,M,H): 03/H 04/L 05/M _____ "Other" _____			
II. HABITAT AND VEGETATION DESCRIPTION			
Tree DBH: T1 (<1" dbh), T2 (1-6" dbh), T3 (6-11" dbh), T4 (11-24" dbh), T5 (>24" dbh), T6 multi-layered (T3 or T4 layer under T5, >60% cover)			
Shrub: S1 seedling (<3 yr. old), S2 young (<1% dead), S3 mature (1-25% dead), S4 decadent (>25% dead)			
Herb: <input checked="" type="checkbox"/> H1 (<12" plant ht.), H2 (>12" ht.) Desert Riparian Tree/Shrub: 1 (<2ft. stem ht.), 2 (2-10ft. ht.), 3 (10-20ft. ht.), 4 (>20ft. ht.)			
Desert Palm/Joshua Tree: 1 (<1.5" base diameter), 2 (1.5-6" diam.), 3 (>6" diam.) % NonVasc cover: 0 % Vasc Veg cover: 60			
% Cover: Conifer tree / Hardwood tree: 0 / 0 Regenerating Tree: 0 Shrub: 0 Herbaceous: 60			
Height Class: Conifer tree / Hardwood tree: _____ / _____ Regenerating Tree: _____ Shrub: _____ Herbaceous: 01			
Height classes: 01=<1/2m 02=1/2-1m 03=1-2m 04=2-5m 05=5-10m 06=10-15m 07=15-20m 08=20-35m 09=35-50m 10=>50m			
Species, Stratum, and % cover. Stratum categories: T=Tree, S=Shrub, H=Herb, E=SEedling, A=SAPling, N=Non-vascular. % cover intervals for reference: <1%, 1-5%, >5-15%, >15-25%, >25-50%, >50-75%, 75%.			
Strata	Species	% cover	C Strata Species % cover C
H	Centromadia parrinii	40	
H	Festuca perennis	15	
H	Hypochaeris glabra	1	
H	Bromus hordeaceus	3	
H	Festuca bromoides	1	
Unusual species: _____			
III. INTERPRETATION OF STAND			
Field-assessed vegetation alliance name: Centromadia parrinii			
Field-assessed association name (optional): Centromadia parrinii - Festuca perennis			
Adjacent alliances/direction: _____			
Confidence in alliance identification: L <input checked="" type="checkbox"/> M <input checked="" type="checkbox"/> H Explain: Not a recognized alliance in mcv.			
Phenology (E,P,L): Herb L Shrub Tree Other identification or mapping information: _____			

Stand ID: CNPS 01

View North



View West



View East



View South



CNPS and CDFW Combined Vegetation Rapid Assessment and Relevé Field Form

(Revised February 27, 2014)

For Office Use Final database #:		Final vegetation type: Alliance _____ Association _____	
I. LOCATIONAL/ENVIRONMENTAL DESCRIPTION			
Stand ID: <u>CNPS 2</u>	Date: <u>8/3/01</u>	Name of recorder: <u>Mike Bower, M.S.</u>	Other surveyors: <u>Momira Coel, B.A.</u>
GPS name: <u>TABLETA</u> Datum: NAD83 or _____		For Relevé: Bearing°, left axis at SW point _____ of <u>Long</u> / Short side	
UTME _____ UTMN _____		Zone: <u>10</u> / 11 (circle one) Error: ± _____ ft / m / pdop	
GPS within stand? <input checked="" type="checkbox"/> Yes / No If No, cite from GPS to stand: distance (m) _____ bearing ° _____ inclination ° _____ and record projected UTM: UTME _____ UTMN _____			
Elevation: <u>8</u> ft / m Camera Name/Photograph #'s: <u>MJB N-E-S-W</u>			
Stand Size (acres): <1, <u>1-5</u> , >5 Plot Size (m²): 10 / 100 / 400 / 1000 Plot Shape _____ x _____ ft / m or Circle Radius <u>10</u> ft / m			
Exposure, Actual °: <u>0</u> NE NW SE SW <input checked="" type="checkbox"/> Flat Variable All Steepness, Actual °: <u>0</u> <u>0</u> 1-5° 5-25° >25			
Topography: Macro: top upper mid lower <input checked="" type="checkbox"/> bottom		Micro: convex flat concave <input checked="" type="checkbox"/> undulating	
Geology code: <u>CLAL</u> Soil Texture code: <u>MFSL</u>		<input checked="" type="checkbox"/> Upland or Wetland/Riparian (circle one)	
% Surface cover: (Incl. outcrops) (>60cm diam) (25-60cm) (7.5-25cm) (2mm-7.5cm) (Incl sand, mud)			
H20: <u>0</u> BA Stems: <u>5</u> Litter: <u>90</u> Bedrock: <u>0</u> Boulder: <u>0</u> Stone: <u>0</u> Cobble: <u>0</u> Gravel: <u>0</u> Fines: <u>5</u> =100%			
% Current year bioturbation <u>1</u> Past bioturbation present? <input checked="" type="checkbox"/> Yes / No % Hoof punch <u>0</u>			
Fire evidence: Yes / <input checked="" type="checkbox"/> No (circle one) If yes, describe in Site history section, including date of fire, if known.			
Site history, stand age, comments: <u>Stand grazed by cattle. Hydrology likely altered through drainage ditches that run N-S. Portions of stand burned in 2000.</u>			
Disturbance code / Intensity (L,M,H): <u>04/L 05/L</u> / / / / "Other" _____ / _____			
II. HABITAT AND VEGETATION DESCRIPTION			
Tree DBH: T1 (<1" dbh), T2 (1-6" dbh), T3 (6-11" dbh), T4 (11-24" dbh), T5 (>24" dbh), T6 multi-layered (T3 or T4 layer under T5, >60% cover)			
Shrub: S1 seedling (<3 yr. old), S2 young (<1% dead), S3 mature (1-25% dead), S4 decadent (>25% dead)			
Herb: H1 (<12" plant ht.), H2 (>12" ht.) Desert Riparian Tree/Shrub: 1 (<2ft. stem ht.), 2 (2-10ft. ht.), 3 (10-20ft. ht.), 4 (>20ft. ht.)			
Desert Palm/Joshua Tree: 1 (<1.5" base diameter), 2 (1.5-6" diam.), 3 (>6" diam.) % NonVasc cover: <u>0</u> % Vasc Veg cover: <u>95</u>			
% Cover: Conifer tree / Hardwood tree: _____ / _____ Regenerating Tree: _____ Shrub: _____ Herbaceous: <u>95</u>			
Height Class: Conifer tree / Hardwood tree: _____ / _____ Regenerating Tree: _____ Shrub: _____ Herbaceous: <u>01</u>			
Height classes: 01=<1/2m 02=1/2-1m 03=1-2m 04=2-5m 05=5-10m 06=10-15m 07=15-20m 08=20-35m 09=35-50m 10=>50m			
Species, Stratum, and % cover. Stratum categories: T=Tree, S=Shrub, H=Herb, E=SEedling, A=SApling, N=Non-vascular. % cover intervals for reference: <1%, 1-5%, >5-15%, >15-25%, >25-50%, >50-75%, 75%.			
Strata	Species	% cover	C
H	<i>Distichlis spicata</i>	<u>80</u>	
H	<i>Festuca perennis</i>	<u>3</u>	
H	<i>Hordeum maritimum</i>	<u>5</u>	
H	<i>Bromus hordeaceus</i>	<u>5</u>	
H	<i>Frankenia salina</i>	<u>3</u>	
H	<i>Lactuca serriola</i>	<u>1</u>	
Unusual species: _____			
III. INTERPRETATION OF STAND			
Field-assessed vegetation alliance name: <u>Distichlis spicata herbaceous alliance</u>			
Field-assessed association name (optional): _____			
Adjacent alliances/direction: _____ / _____ / _____			
Confidence in alliance identification: L M <input checked="" type="checkbox"/> H Explain: <u>Distichlis clearly dominant</u>			
Phenology (E,P,L): Herb <u>L</u> Shrub _____ Tree _____ Other identification or mapping information: _____			

Stand ID: CNPS 02

View North



View West



View East



View South



CNPS and CDFW Combined Vegetation Rapid Assessment and Relevé Field Form
(Revised February 27, 2014)

For Office Use Final database #:	Final vegetation type: Alliance _____ Association _____						
I. LOCATIONAL/ENVIRONMENTAL DESCRIPTION							
Stand ID: <u>CNPS 3</u>	Date: <u>8/3/21</u>						
Name of recorder: <u>Mike Bower, M.S.</u>							
Other surveyors: <u>Monica Coll, B.A.</u>							
GPS name: <u>TABLET A</u> Datum: NAD83 or _____	For Relevé: Bearing°, left axis at SW point _____ of <u>Long / Short</u> side						
UTME _____ UTMN _____	Zone: <u>10 / 11</u> (circle one) Error: ± _____ ft / m / pdop						
GPS within stand? <input checked="" type="checkbox"/> Yes / No <input type="checkbox"/> If No, cite from GPS to stand: distance (m) _____ bearing ° _____ inclination ° _____ and record projected UTM's: UTME _____ UTMN _____							
Elevation: <u>7</u> ft / m Camera Name/Photograph #'s: <u>MJB N-E-S-W</u>							
Stand Size (acres): <1, <u>1-5</u> , >5 Plot Size (m ²): 10 / 100 / 400 / 1000 Plot Shape _____ x _____ ft / m or Circle Radius <u>10</u> ft (m)							
Exposure, Actual °: <u>0</u> NE NW SE SW <u>Flat</u> <u>Variable</u> All Steepness, Actual °: <u>0</u> <u>0</u> 1-5° 5-25° >25							
Topography: Macro: top upper mid lower <u>bottom</u> Micro: convex flat concave <u>undulating</u>							
Geology code: <u>CLAL</u> Soil Texture code: <u>MFSL</u> Upland or <u>Wetland/Riparian</u> (circle one)							
% Surface cover: (Incl. outcrops) (>60cm diam) (25-60cm) (7.5-25cm) (2mm-7.5cm) (Incl sand, mud)							
H20: <u>0</u> BA Stems: <u>1</u> Litter: <u>10</u> Bedrock: <u>0</u> Boulder: <u>0</u> Stone: <u>0</u> Cobble: <u>0</u> Gravel: <u>0</u> Fines: <u>89</u> =100%							
% Current year bioturbation _____ Past bioturbation present? Yes / <input checked="" type="checkbox"/> No % Hoof punch <u>0</u>							
Fire evidence: Yes / <input checked="" type="checkbox"/> No (circle one) If yes, describe in Site history section, including date of fire, if known.							
Site history, stand age, comments: <u>Stand grazed by cattle, hydrology modified by N-S ditches and road berm to south.</u>							
Disturbance code / Intensity (L,M,H): <u>04 / L 05 / L</u> / / / / "Other" _____ / _____							
II. HABITAT AND VEGETATION DESCRIPTION							
Tree DBH: T1 (<1" dbh), T2 (1-6" dbh), T3 (6-11" dbh), T4 (11-24" dbh), T5 (>24" dbh), T6 multi-layered (T3 or T4 layer under T5, >60% cover)							
Shrub: S1 seedling (<3 yr. old), S2 young (<1% dead), S3 mature (1-25% dead), S4 decadent (>25% dead)							
Herb: H1 (<12" plant ht.), H2 (>12" ht.) Desert Riparian Tree/Shrub: 1 (<2ft. stem ht.), 2 (2-10ft. ht.), 3 (10-20ft. ht.), 4 (>20ft. ht.)							
Desert Palm/Joshua Tree: 1 (<1.5" base diameter), 2 (1.5-6" diam.), 3 (>6" diam.) % NonVasc cover: <u>0</u> % Vasc Veg cover: <u>30</u>							
% Cover: Conifer tree / Hardwood tree: <u>0 / 0</u> Regenerating Tree: <u>0</u> Shrub: <u>0</u> Herbaceous: <u>30</u>							
Height Class: Conifer tree / Hardwood tree: _____ / _____ Regenerating Tree: _____ Shrub: _____ Herbaceous: <u>01</u>							
Height classes: 01=<1/2m 02=1/2-1m 03=1-2m 04=2-5m 05=5-10m 06=10-15m 07=15-20m 08=20-35m 09=35-50m 10=>50m							
Species, Stratum, and % cover. Stratum categories: T=Tree, S=Shrub, H=Herb, E=SEedling, A=SApling, N=Non-vascular. % cover intervals for reference: <1%, 1-5%, >5-15%, >15-25%, >25-50%, >50-75%, 75%.							
Strata	Species	% cover	C	Strata	Species	% cover	C
S	Salicornia depressa	5					
S	Salicornia pacifica	8					
S	Frankenia salina	8					
H	Parapholis incurva	6					
H	Juncus bufonius	3					
H	Potula coronopifolia	2					
H	Hordeum maritimum	4					
Unusual species: _____							
III. INTERPRETATION OF STAND							
Field-assessed vegetation alliance name: <u>Salicornia depressa - S. pacifica - Frankenia salina</u>							
Field-assessed association name (optional): _____							
Adjacent alliances/direction: <u>Distichlis spicata, N</u>							
Confidence in alliance identification: <input checked="" type="checkbox"/> L <input type="checkbox"/> M <input type="checkbox"/> H Explain: <u>Unknown if recognized alliance</u>							
Phenology (E,P,L): Herb <input checked="" type="checkbox"/> Shrub <input checked="" type="checkbox"/> Tree _____ Other identification or mapping information: _____							

Stand ID: CNPS 03

View North



View West



View East



View South



Stand ID: CNPS 04

View North



View West



View East



View South



C.2 - Biological Impacts and Proposed Mitigation Measures

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TECHNICAL MEMORANDUM

To: Joe Livaich
Vice President, Planning and Preconstruction Services
Buzz Oates Construction, Inc.
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From: Michael Bower, M.S., Senior Botanist
P: 916.427.0703 C: 530.902.8721
Email: Michael.Bower@swca.com

Date: May 31, 2022

Re: Biological Impacts and Proposed Mitigation Measures for the Suisun Logistics Center Project, Solano County, California

INTRODUCTION

This memorandum describes impacts to biological resources resulting from the proposed Suisun Logistics Center Project (Project), and the proposed avoidance and minimization measures and mitigation measures that Suisun City may include in the CEQA document. The approximately 173.17-acre biological study area (BSA) is located southeast of the intersection of Walters and Petersen Road, adjacent to Suisun City in unincorporated Solano County, California. The BSA includes the main site (169.03 acres on APN 0174-190-140), and adjacent road frontage along State Route 12 (2.94 acres) and Petersen Road (1.20 acres). The proposed project consists of six industrial buildings, loading docks, uncovered parking, driveway access from Walters and Petersen Road, bioretention areas and landscaping. The proposed development will impact approximately 127.87 acres. Wetland creation is proposed in the avoided open space area comprising 45 acres (+/-), located immediately south of the proposed development. It is anticipated that between five and ten acres of wetland habitat may be created in the open space to compensate for impacts from this project.

SWCA Environmental Consultants documented baseline biological resources in the BSA in an Aquatic Resources Delineation Report (SWCA 2021a) and Biological Resources Evaluation and Botanical Inventory Report (BRE; SWCA 2021b). General biological surveys and fieldwork for the wetland delineation were conducted from October 2020 through November 2021. The delineation was field verified with the U.S. Army Corps of Engineers on October 28, 2021. Protocol botanical surveys were conducted in March, April, July, and August 2021. Natural communities in the BSA consist of valley floor grassland, alkali meadow, seasonal wetland (subtypes: pool, swale, mesic grassland, alkaline meadow, playa pool), freshwater marsh, coastal brackish marsh, and drainage ditches. The BSA contains potential habitat for 26 special-status wildlife species, 41 special-status plants, and federal designated critical habitat for conservancy fairy shrimp, vernal pool fairy shrimp, vernal pool tadpole shrimp, and Contra Costa goldfields. Biological resources evaluated include species addressed as Covered Species and Special Management Species in the Draft Solano HCP (SCWA 2012).

Proposed impacts to the natural communities are summarized in Table Bio-1 and shown on Figure Bio-2. Approximately 127.87 acres would be permanently impacted. The project impacts valley floor grassland, drainage ditch (including portions of the drainage ditch mapped as seasonal wetland/freshwater marsh), seasonal wetland, developed (ruderal) land, and developed (hardscape) land.

Table Bio-1. Proposed Impacts to Natural Communities

Natural Community	Existing Acreage In BSA	Impacts to Natural Communities (acres)				Avoided Acreage
		Main Site	Offsite - Petersen Rd	Offsite - SR 12	BSA Total Impact ¹	
Valley Floor Grassland	133.25	121.10	0	0	121.10	12.15
Alkali Meadow	16.91	0	0	0	0	16.91
Drainage Ditch (Roadside Ditch)	0.09	0	0.09	0	0.09	0
Drainage Ditch (Seasonal Wetland)	0.65	0.54	< 0.01 ac (68 sf)	0	0.54	0.11
Drainage Ditch (Freshwater Marsh)	0.74	0.57	< 0.01 ac (103 sf)	0	0.57	0.17
Seasonal Wetland	14.57	4.46	0.04	0	4.50	10.07
Coastal Brackish Marsh	3.36	0	0	0	0	3.36
Developed (Ruderal)	2.89	0	0.87	0	0.87	2.02

Developed (Hardscape)	0.71	0	0.20	0	0.20	0.51
Total	173.17	126.67	1.20	0	127.87	45.30

¹ The total impact from the Project footprint is approximately 127.87 acres. Wetland creation is proposed in the conservation easement immediately south of the footprint. The wetland creation may result in additional impact to non-wetland habitat.

This memorandum is organized in sections corresponding to sections of the CEQA Checklist for Biological Resources (CEQA Guidelines Appendix G):

- I. Special-status Plant Species
- II. Special-status Wildlife Species
- III. Riparian Habitat and Other Sensitive Natural Communities
- IV. Protected Wetlands and Waters
- V. Wildlife Movement, Corridors, and Nursery Sites
- VI. Local Policies and Ordinances Protecting Biological Resources
- VII. Adopted HCP, NCCP, or Other Conservation Plans

I. Special-status Plant Species

a. Proposed Impact

The proposed project may have a substantial adverse impact on special-status plant species.

The BRE identified 41 species of special-status plants with the potential to occur in the project Biological Study Area (BSA) based on database searches, general biological surveys, wetland delineation fieldwork, and protocol botanical surveys conducted in 2021 and 2022 (SWCA 2021b; SWCA 2022). A CNDDDB record of bearded popcorn flower (*Plagiobothrys hystriculus*) overlaps the BSA. The record is based on an herbarium specimen collected over 5 miles southeast of the BSA. No other CNDDDB records of special-status plants occur in the BSA. Nearest known records are discussed in the BRE (SWCA 2021b).

The following special-status plants were observed in the BSA during the botanical surveys: 1) a total of 47 Contra Costa goldfield plants located in one seasonal wetland near the western edge of the site, 2) approximately 6,196,679 pappose tarplant individuals located mostly in the central, eastern, and southern portions of the BSA and 3) approximately 905 saline clover individuals in the southern portion of the BSA.

The proposed project will impact a total of 47 Contra Costa goldfield plants occupying 0.03 acre. The proposed project will impact approximately 4,280,464 pappose tarplant plants occupying approximately 29.92 acres. The proposed project will avoid saline clover, the nearest population of which occurs approximately 150 feet to the south. Proposed project impacts to Contra Costa goldfields and pappose tarplant would be potentially significant without mitigation.

Federal endangered and California Rare Plant Rank (CRPR) 1B.1 Contra Costa goldfields were documented in low abundance within the BSA during previous surveys conducted by LSA in 2006 – 2008 (LSA 2010). The location of the occurrences is shown in Figure 4-5 of the Draft Solano HCP (Contra Costa Goldfield Population Areas). This species was verified as evident and identifiable at nearby reference populations in April 2021 and in March and April in 2022 (SWCA 2021b; SWCA 2022) and at the Goldfields Conservation Bank site located in Fairfield between Walters Road and Airbase Parkway on April 23, 2021 (HBG 2021). No Contra Costa goldfields were observed in the BSA during the 2021 protocol survey. During the 2022 protocol survey, 47 Contra Costa goldfields plants were documented in Seasonal Wetland (SW) 51 in the western portion of the site (SWCA 2022).

The entire 127.87-acre proposed project occurs in federal designated critical habitat for Contra Costa goldfields. The condition of the critical habitat affected by the proposed project is poor. The area has been degraded by cultivation, altered hydrology from ditches and road berms, invasion by nonnative grasses, and the presence of Fremont's goldfields (*Lasthenia fremontii*), which are known to hybridize with Contra Costa goldfields (SWCA 2021, 2022). The proposed project will require a Section 404 Clean Water Act permit from the U.S. Army Corps of Engineers (USACE). The USACE will consult with U.S. Fish and Wildlife Service (USFWS) during the 404 CWA permitting regarding Contra Costa goldfields, its critical habitat, and other federal listed species and critical habitat for other species. Proposed project impacts to approximately 127.87 acres of Contra Costa goldfields critical habitat would be potentially significant without mitigation.

Figure Bio-1 is a map showing impacts to natural communities. Figure Bio-2 is a map showing impacts to rare plants documented during the 2021 and 2022 protocol botanical surveys.

b. Proposed Mitigation

The Project proposes the following mitigation measure to minimize potential adverse impacts to special-status plants:

BIO-1a: *Prior to issuance of a grading permit for activities within valley floor grassland or seasonal wetland communities, the project applicant shall retain a qualified botanist/biologist to prepare a Pappose Tarplant Mitigation and Monitoring Plan (PTMMP). At minimum, the mitigation plan shall include seedbank-harvesting procedures, locations where the seedbank will be placed in suitable habitat adjacent to the project site, success criteria, and monitoring activities. The plan shall set forth a minimum 1:1 re-establishment rate, equivalent to 4,280,464 pappose tarplant plants or 29.92 acres occupied with at least 25% absolute cover of pappose tarplant. Monitoring activities shall include five years of annual monitoring of the establishment areas by a qualified botanist/biologist. A letter report documenting annual monitoring results shall be prepared by a qualified botanist/biologist and submitted to the City and CDFW by December of each monitoring year. Seedbank salvage activities shall be completed prior to grading activities. The City of Suisun City shall review and approve the PTMMP prior to issuing the grading permit. The City shall verify the successful completion of the activities outlined in the PTMMP. If mitigation adjacent to the Project site is not feasible, the Project may elect to purchase credits for 29.92 acres of conservation land occupied by*

pappose tarplant. Such credits may be for wetlands or upland habitat so long as it is occupied by pappose tarplant. In the event the Solano HCP is adopted after the project is approved, the project applicant shall have the discretion to implement this mitigation measure, or the mitigation set forth in the HCP. (Pappose tarplant is a Special Management Species in the Draft Solano HCP.)

BIO-1b: *Prior to issuance of a grading permit for activities within valley floor grassland or seasonal wetland communities, the project applicant shall provide the results of a follow-up botanical survey by a qualified botanist documenting the current (within the last 2 years) distribution and abundance of Contra Costa goldfields in the project footprint. The survey shall be conducted according to current U.S. Fish & Wildlife Service and California Department of Fish & Wildlife protocols.*

The applicant shall fully avoid Contra Costa goldfield plants and occupied Contra Costa goldfield habitat (see definition below). Full avoidance shall include a setback of at least 50 feet from all permanent and temporary project impacts. If full avoidance is not feasible, the applicant shall obtain federal Endangered Species Act (ESA) incidental take coverage through a consultation process with USFWS. The applicant shall prepare and submit a Contra Costa Goldfields Mitigation and Monitoring Plan (CCGMMP) to the City and USFWS. The implementation of the CCGMMP would be required as part of the incidental take coverage. At minimum, the CCGMMP shall include seedbank-harvesting procedures, locations where the seedbank will be placed in suitable habitat adjacent to the project site, success criteria, and monitoring activities. The plan shall set forth a minimum 1:1 re-establishment rate (in terms of the number of individual Contra Costa goldfields impacted, or occupied habitat as determined by the most recent botanical survey (as of April 2022, Seasonal Wetland 51 occupying 0.03 acre is the only habitat occupied by Contra Costa goldfields). Monitoring activities shall include five years of annual monitoring of the establishment areas by a qualified botanist/biologist. Annual monitoring reports shall be prepared by a qualified botanist/biologist and submitted to the City and USFWS by December of each monitoring year. Seedbank salvage activities shall be completed prior to grading activities. The City of Suisun City and the USFWS shall review and approve the CCGMMP prior to issuing the grading permit. The applicant shall be responsible for implementing the plan, including funding, monitoring, reporting, and performance of any remedial activities required by the plan. The City shall verify the successful completion of the activities outlined in the CCGMMP.

If mitigation for Contra Costa goldfields is not feasible in areas adjacent to the Project site, the Project may purchase credits for Contra Costa goldfields at a USFWS-approved bank at a minimum ratio of 2:1 for occupied habitat. The term "occupied habitat" is either the extent of the occupied wetland or, if a plant is located in an upland, an area buffered by a 50-foot radius. Proof of purchase of all required Contra Costa goldfields mitigation credits shall be provided to the City prior to issuance of the grading permit.

If during permitting with the USFWS it is determined that additional measures beyond that outlined above are required for impacts to Contra Costa goldfields critical habitat, those measures shall be implemented by the applicant according to the terms of the project's Endangered Species Act incidental take coverage. The applicant shall include those

measures in the CCGMMP, allowing the City the opportunity to review and verify implementation.

In the event the Solano HCP is adopted after the project is approved, the project applicant shall have the discretion to implement this mitigation measure, or the mitigation set forth in the HCP. (Contra Costa goldfields are a Covered Species in the Draft Solano HCP.)

II. Special-status Wildlife Species

a. Proposed Impact

The proposed project may have a substantial adverse impact on special-status wildlife species

The BRE identified 26 species of special-status wildlife with the potential to occur in the BSA based on database searches, general biological surveys, wetland delineation fieldwork, and habitat characterization conducted in 2020 and 2021 (SWCA 2021b). There are no CNDDDB records of special-status wildlife in the BSA. Nearest known records are discussed in the BRE (SWCA 2021b).

No federal or state listed wildlife species were observed during the biological surveys. Protocol surveys for listed vernal pool branchiopods were not conducted. The following special-status wildlife were observed foraging in or over the BSA during surveys: 1) northern harrier (*Circus cyaneus*; state species of special concern), 2) white-tailed kite (*Elanus leucurus*; state fully protected), and 3) loggerhead shrike (*Lanius ludovicianus*; state species of special concern). Numerous birds of prey species protected under the California Fish and Game Code and/or the Migratory Bird Treaty Act were observed foraging over the BSA. No potential raptor nests were observed in the BSA. No burrows suitable for burrowing owl or badgers were observed in the BSA.

General biological surveys are not protocol surveys and, in most cases, are not sufficient evidence to conclude a species is absent and that no impacts will occur. Without mitigation, the proposed project could result in potentially significant impacts to the following wildlife species: Conservancy fairy shrimp (*Branchinecta conservatio*), vernal pool fairy shrimp (*Branchinecta lynchi*), Ricksecker's water scavenger beetle (*Hydrochara rickseckeri*), vernal pool tadpole shrimp (*Lepidurus packardii*), California tiger salamander, Central California DPS (*Ambystoma californiense*), western pond turtle (*Emys marmorata*), tricolored blackbird (*Agelaius tricolor*), grasshopper sparrow (*Ammodramus savannarum*), short-eared owl (*Asio flammeus*), burrowing owl (*Athene cunicularia*), Swainson's hawk (*Buteo swainsoni*), mountain plover (*Charadrius montanus*), northern harrier, white-tailed kite, loggerhead shrike, Suisun song sparrow (*Melospiza melodia maxillaris*), yellow-headed blackbird (*Xanthocephalus xanthocephalus*), nesting raptors and birds of prey, and American badger (*Taxidea taxus*).

The following species have some degree of habitat present in the BSA, but the Project would not result in potentially significant impacts either because the habitat is not present in the footprint, or because the Project would not affect the resource of concern (e.g., butterfly

wintering sites, bird nesting sites): monarch butterfly (*Danaus plexippus plexippus*), delta green ground beetle (*Elaphrus viridis*), golden eagle (*Aquila chrysaetos*), yellow rail (*Coturnicops noveboracensis*), California-black rail (*Laterallus jamaicensis coturniculus*), salt marsh harvest mouse (*Reithrodontomys raviventris*), and Suisun shrew (*Sorex ornatus sinuosus*).

Impacts to Aquatic Invertebrates

Proposed project impacts to approximately 4.50 acres of seasonal wetland may result in potentially significant impacts to Conservancy fairy shrimp, vernal pool fairy shrimp, Ricksecker's water scavenger beetle, and vernal pool tadpole shrimp. The BRE includes an analysis of seasonal wetland hydrology (see BRE Table 5, Aquatic Feature Summary and Characterization). Most of the affected seasonal wetlands are heavily disturbed by disking and dryland farming and do not inundate for sufficient duration to provide breeding habitat for these species. Some of the affected wetlands provide potential breeding habitat, as detailed in the BRE. These aquatic invertebrate species are potentially present in at least some of the 4.50 acres of seasonal wetlands that would be affected (SWCA 2021b). The project would reduce the amount of potentially suitable habitat and could result in 'take' of the federal listed Conservancy fairy shrimp, vernal pool fairy shrimp, and vernal pool tadpole shrimp should these species be present. The proposed project occurs in federal designated critical habitat for Conservancy fairy shrimp (approximately the southeast third of the project), vernal pool fairy shrimp (the entire project), and vernal pool tadpole shrimp (the entire project), the adverse modification of which may require authorization from the U.S. Fish and Wildlife Service. Since the project has the potential to take these species and affect potential habitat, impacts to Conservancy fairy shrimp, vernal pool fairy shrimp, Ricksecker's water scavenger beetle, and vernal pool tadpole shrimp could be significant without mitigation.

Impacts to California Tiger Salamander

Proposed project impacts to approximately 121.10 acres of valley floor grassland, 4.50 acres of seasonal wetland, and 1.20 acres of drainage ditch may result in potentially significant impacts to California tiger salamander (CTS). While no CTS breeding habitat occurs in the area that would be affected, potential CTS breeding habitat does occur within dispersal distance (1.24 miles). The affected habitats may serve as foraging or dispersal habitat for the salamander, which spends most of its adult life in underground burrows. Habitat in the BSA is marginal due to ongoing disking and dryland farming and potential salinity tolerance limits (especially in the southern portion of the BSA). CTS are potentially present within the BSA, but the likelihood of occurrence is low (SWCA 2021b). The project would reduce the amount of potentially suitable foraging and dispersal habitat for CTS by a total of approximately 126.8 acres and could result in 'take' under federal and state endangered species act should any CTS be present in the affected areas. Since the project has the potential to injure and kill individuals, impacts to CTS could be significant without mitigation.

Impacts to Western Pond Turtle

Project construction affecting the freshwater marsh in Drainage Ditch DD-01 and the surrounding area could injure or kill western pond turtle (WPT). Habitat in the ditch is marginal and of limited extent. No WPT nesting would be expected in the BSA due to a lack of sufficient suitable aquatic habitat, and the hard silty-clayey soils that occur throughout the BSA (SWCA

2021b). WPT could be present in DD-01 and could migrate through the BSA. Since the project has the potential to injure and kill individuals, impacts to WPT could be significant without mitigation.

Impacts to Burrowing Owl

As a bird species that nests and shelters within underground burrows, burrowing owl is especially vulnerable to construction related impacts. Project construction has the potential to injure or kill burrowing owl and could cause nest abandonment if occupied burrows occur in or adjacent to the footprint or work areas. While no owls or potentially suitable burrows were observed during biological surveys, burrows could become established and occupied in the future (SWCA 2021b). The nearest record of burrowing owl is from 1992, approximately 1 mile south of the BSA on the opposite side of a large area of coastal marsh. The next closest records are from 1982 and 1989, over 1.5 miles to the northeast, north of Travis AFB. While the project will reduce the amount of regionally available foraging habitat for burrowing owl, there is ample foraging habitat of equal or greater value available in the areas to the northeast, east, and south, in the vicinity of the known records. Proposed impacts to approximately 126.8 acres of foraging habitat will not result in regional decline of the species. Since the project has the potential to injure and kill individuals and cause nest abandonment, impacts to burrowing owl could be significant without mitigation.

Impacts to Swainson's Hawk

A few young/small riparian trees along the drainage ditches DD-01 and DD-02 may be removed. The trees are not large enough to support the nest of a large raptor. Swainson's hawks could nest in suitable off-site trees located within 0.25 mile and forage in the study area. The closest CNDDDB record (Occurrence #2714) is from 2015, approximately 3.4 miles northeast of the BSA, north of Cement Hill Road. The BRE identifies trees outside the BSA but still in the project vicinity that could serve as suitable nesting habitat for Swainson's hawk. Impacts to approximately 126.8 acres of Swainson's hawk foraging habitat could be significant without mitigation.

Impacts to Nesting and Overwintering Birds

Project construction has the potential to disrupt nesting and overwintering birds including tricolored blackbird, grasshopper sparrow, short-eared owl, Swainson's hawk, mountain plover, northern harrier, white-tailed kite, loggerhead shrike, Suisun song sparrow, yellow-headed blackbird, and other nesting raptors and birds of prey protected under the federal Migratory Bird Treaty Act and/or California Fish and Game Code. While no active nests were observed during the general biological surveys, active nests could become established in the BSA or adjacent areas and project construction could lead to nest destruction or abandonment. Impacts to protected nesting and overwintering birds could be significant without mitigation.

Impacts American Badger

No American badgers or sign were observed during general biological surveys. The seasonally elevated water table, especially in the southern portion of the study area, may limit suitability for denning. There is a limited prey base; No California ground squirrels were observed in the BSA. While the project will reduce the amount of regionally available foraging

habitat, there is ample foraging habitat of equal or greater value available in the areas to the northeast, east, and south, in the vicinity of the known records. Proposed impacts to foraging habitat will not result in regional decline of the species. Project impacts to American badger are less than significant.

b. Proposed Mitigation

The Project proposes the following mitigation measure to minimize potential adverse impacts to special-status wildlife:

BIO-2a: *Prior to the first ground-disturbing activities, the project applicant shall retain a qualified wildlife biologist acceptable to the City Development Services Director or the Director's designee, and USFWS, to conduct focused protocol surveys for Conservancy fairy shrimp, vernal pool fairy shrimp, and vernal pool tadpole shrimp to determine the presence/absence of these species within the disturbance area. The survey will also cover Ricksecker's water scavenger beetle. The protocol surveys shall be conducted according to the guidelines established by latest edition of the Survey Guidelines for the Listed Large Branchiopods. If Conservancy fairy shrimp, vernal pool fairy shrimp, or vernal pool tadpole shrimp are determined to be present on-site, potential impacts to these species will necessitate ESA consultation with USFWS. At a minimum, the following performance standards shall be satisfied regardless of what USFWS requires through such a consultation. Effects on Conservancy fairy shrimp, vernal pool fairy shrimp, vernal pool tadpole shrimp, Ricksecker's water scavenger beetle, and their habitat shall be avoided, if feasible. If avoidance is not feasible, the applicant shall ensure the compensation, at a ratio of no less than 1:1, of offsite habitat of equal or superior quality to that disturbed by the project. Such compensation shall be achieved through the use of conservation easements, mitigation banks, or similar strategies resulting in permanent protection. If acceptable to USFWS and scientifically defensible, the applicant may use preserved lands, or portions thereof, not only for habitat for Conservancy fairy shrimp, vernal pool fairy shrimp, and vernal pool tadpole shrimp, but also for Ricksecker's water scavenger beetle, wetlands preservation, and for habitat for other species for which the City is requiring offsite preservation (e.g., California tiger salamander and burrowing owl). The applicant may choose to assume the presence of listed branchiopods for the purposes of consultation with USFWS. In the event the Solano MSHCP is adopted after the project is approved, the project applicant shall have the discretion to implement this mitigation measure, or the mitigation measures set forth in the MSHCP.*

BIO-2b: *Prior to the first ground-disturbing activities, the project applicant shall retain a qualified wildlife biologist acceptable to the City Development Services Director or the Director's designee to conduct focused protocol surveys for California tiger salamander to determine the presence/absence of this species within the disturbance area. If the applicant encounters seasonal conditions, abnormal weather conditions, property access, time constraints, or any other potential barrier to completion of presence/absence surveys, they can assume presence and proceed with consultation and propose conservation/mitigation measures for the proposed effects to habitat. If the applicant chooses to conduct presence/absence surveys, the protocol surveys shall be conducted according to the guidelines established by USFWS Interim Guidance on Site Assessment and Field Surveys*

for Determining Presence or a Negative Finding of the California Tiger Salamander October 2003 or latest edition. If the California tiger salamander is determined to be present or is assumed to be present on the project site, the applicant will need to acquire ESA/CESA take permits. At a minimum, the following performance standards shall be satisfied, regardless of what USFWS requires through such a consultation. Effects on California Tiger Salamander and its habitat shall be avoided, if feasible. If avoidance is not feasible, the applicant shall relocate the species to a suitable location in accordance with resource agency protocols and permit requirements, and shall ensure the preservation, at a ratio of no less than 1:1, of offsite habitat of equal or superior quality to that disturbed by the project. Such preservation shall be achieved through the use of conservation easements, mitigation banks, or similar strategies resulting in permanent preservation. If acceptable to USFWS and CDFW, the applicant may use preserved lands, or portions thereof, not only for habitat for California tiger salamander, but also for wetlands preservation and for habitat for other species for which the City is requiring offsite preservation (e.g., vernal pool fairy shrimp, vernal pool tadpole shrimp, and burrowing owl). In the event the Solano MSHCP is adopted after the project is approved, the project applicant shall have the discretion to implement this mitigation measure, or the mitigation measures set forth in the MSHCP.

BIO-2c: *No more than 30 days prior to the first ground-disturbing activities, the project applicant shall retain a qualified wildlife biologist acceptable to the City Development Services Director or the Director's designee to conduct a focused survey for northwestern pond turtle to determine presence or absence of this species within a 100-foot radius of the disturbance area. If construction occurs between April 1 and September 30, this survey shall include turtle nests. If a nest is found within a 100-foot radius of the project site, construction shall not take place within 100 feet of the nest until the turtles have hatched or the eggs have been moved to an appropriate location under consultation with a qualified biologist. Construction shall be avoided when adults and hatchlings are overwintering (October 1 to February 28/29), because of the likelihood that turtle adults and juveniles could be present in upland habitats. If construction activities must occur during this time frame, a survey for overwintering locations shall be conducted no more than 14 days prior to construction. If this species is found overwintering within the project site, den locations shall be avoided until the area is unoccupied, as determined by a qualified biologist.*

A worker awareness program shall be established and implemented prior to construction. The program shall include, at a minimum, species identification, a description of suitable habitat for this species, and measures to implement in the event that this species is found during construction. The program shall be presented to all members of the construction crew.

A qualified wildlife biologist will be present during initial clearing and grubbing in DD-01 to further minimize potential impacts to turtles. In the event that a turtle is found during project implementation, construction activities shall stop until the turtle is moved by a qualified biologist to a safe location outside the construction zone.

In the event a nest is located, the area shall be fenced and signs shall be posted to alert the construction crew as to the sensitivity of the habitat in question.

In the event the Solano MSHCP is adopted after the project is approved, the project applicant shall have the discretion to implement this mitigation measure, or the mitigation set forth in the MSHCP.

BIO-2d: *No more than 30 days prior to the first ground-disturbing activities, the project applicant shall retain a qualified wildlife biologist acceptable to the City Development Services Director or the Director's designee to conduct a burrowing owl habitat assessment in accordance with latest CDFW guidelines to determine if there are active burrow locations within the disturbance area. Surveys for occupied burrows shall be completed within all construction areas and within 300 feet from the disturbance area (where possible and appropriate based on habitat). If no burrowing owls are detected during the pre-construction survey, no further action is necessary. If construction is delayed or suspended for more than 30 days after the survey, the area shall be resurveyed in accordance with previously described methods. If burrowing owls are found through the pre-construction surveys, all occupied burrows shall be mapped on an aerial photo. At least 15 days prior to the expected start of any project-related ground disturbance activities, or restart of activities, a copy of the burrowing owl survey report and mapping shall be provided to CDFW. If nesting behavior is observed within the known nesting season (February 1 to August 31), a buffer will be established around the burrow (between 50 meters and 500 meters depending on time of year and disturbance level, as described in the 2012 CDFW staff report) until the young have fledged, or an unsuccessful nesting attempt is documented. If occupied burrows (non-nesting season, or non-breeding occupation) are found and direct impacts to the burrows are unavoidable, the first step shall be the exclusion and passive relocation of the owls as described in the 2012 staff report, including preparation and approval of a burrowing owl exclusion and passive relocation plan. The second step shall be the preservation, at a ratio of no less than 1:1, of offsite habitat of equal or superior quality to that disturbed by the project. Such preservation shall be achieved through the use of conservation easements, mitigation banks, or similar strategies resulting in permanent preservation. If scientifically defensible and acceptable to any resources agencies whose permission is necessary, the applicant may use preserved lands, or portions thereof, not only for habitat for burrowing owl, but also for wetlands preservation and for habitat for other species for which the City is requiring offsite preservation (e.g., vernal pool fairy shrimp, vernal pool tadpole shrimp, and California tiger salamander). In the event the Solano MSHCP is adopted after the project is approved, the project applicant shall have the discretion to implement this mitigation measure, or the mitigation set forth in the MSHCP.*

BIO-2e: *Between March 1 and August 31, a qualified wildlife biologist acceptable to the City Development Services Director or the Director's designee shall conduct pre-construction surveys to identify and subsequently avoid nesting Swainson's hawk. A qualified biologist shall conduct pre-construction surveys based on the Swainson's hawk Technical Advisory Committee's Recommended Timing and Methodology for Swainson's hawk Nesting Surveys (May 2000) to determine the presence or absence of nesting Swainson's hawk. Surveys require at least 7 days of surveying, depending on the project schedule (1 visit January-March 20, 3 visits March 20-April 5, and 3 visits April 5 to April 20.) The survey will be of sufficient intensity to document nesting within 0.25 mi (1,320 ft) of planned work*

activities. If a lapse in project-related construction work of 15 days or longer occurs, additional pre-construction surveys shall be required before project work may be reinitiated. If a nest is occupied after April 20, a buffer will be created to protect the nesting hawks through the post-fledging period (July 30).

Construction work (including grading, earthmoving, and any operation of construction equipment) shall not occur within a 0.25 mi buffer zone around an active Swainson's hawk nest except as provided below. Construction work may commence in the buffer zone when a qualified wildlife biologist acceptable to the City Development Services Director or the Director's designee has confirmed that nesting activity is complete (e.g., Swainson's hawk young have fully fledged and are capable of flight and have left the nest, or the adults have abandoned the nest for a minimum of 7 days and there is no evidence of re-nesting activity). Nest trees may be removed between September 16 and February 1 when nests are unoccupied.

The size of nest site buffer zones may be reduced only under the following conditions:

1. A site-specific analysis prepared by the qualified biologist indicates that the nesting pair under consideration are not likely to be adversely affected by construction activities¹ (e.g., the nest is located in an area where the hawks are habituated to human activity and noise levels comparable to anticipated construction work). Either CDFW, or the HCP Technical Review Committee (if the HCP is adopted), must approve this analysis before construction may begin within 0.25 mi of a nest.

2. Monitoring by a qualified biologist is conducted for a sufficient time (during all construction activities for a minimum of 10 consecutive days following the initiation of construction), and the nesting pair does not exhibit adverse reactions to construction activities (e.g., changes in behavioral patterns, reactions to construction noise).

3. Monitoring is continued at least once a week through the nesting cycle at that nest. This longer-term monitoring may be reduced to a minimum of 2 hours in the morning and 2 hours in the afternoon during construction activities; however, additional and more frequent monitoring may be required if any adverse reactions are noted.

If a nest tree becomes occupied by Swainson's hawk during ongoing construction activities, construction activities shall not occur within 500 ft of the nest, except where monitoring consistent with the criteria in MM BIO 2g documents that adverse effects will not occur.

Long-term impacts to Swainson's hawk foraging habitat in the Valley Floor Grassland Conservation Area shall be mitigated through the preservation and management of foraging habitat at a ratio of 1:1 (mitigation-to-impact). All valley floor grassland mitigation associated with other species will count toward Swainson's hawk foraging habitat.

BIO-2f: *Prior to the first ground-disturbing activities that occur between February 1 and August 31 (i.e., the nesting season), the project applicant shall retain a qualified wildlife biologist acceptable to the City Development Services Director or the Director's designee to*

conduct a nesting bird survey to determine if nests of all applicable migratory species are active or occupied within the project site. Any active nests observed on the project site shall be avoided until after the nestlings have fledged and left the nest. If avoidance of all activities near an active nest is not feasible during the nesting season, then a qualified biologist shall be present and work with the applicant to establish appropriate temporary buffer areas for the nest(s). Depending on species and level of activity, construction activity within up to 250 feet of the active nests may only be conducted at the discretion of the biological monitor. Ground disturbing activities that occur between September 1 and January 31 (i.e., the non-breeding season) are not subject to the provisions of this mitigation measure. In the event the Solano MSHCP is adopted after the project is approved, the project applicant shall have the discretion to implement this mitigation measure, or the mitigation set forth in the MSHCP.

With the inclusion of MMs Bio 2a-2f, impacts to the following wildlife species would be less than significant: Conservancy fairy shrimp (*Branchinecta conservatio*), vernal pool fairy shrimp (*Branchinecta lynchi*), Ricksecker's water scavenger beetle (*Hydrochara rickseckeri*), vernal pool tadpole shrimp (*Lepidurus packardii*), California tiger salamander, Central California DPS (*Ambystoma californiense*), western pond turtle (*Emys marmorata*), tricolored blackbird (*Agelaius tricolor*), grasshopper sparrow (*Ammodramus savannarum*), short-eared owl (*Asio flammeus*), burrowing owl (*Athene cunicularia*), Swainson's hawk (*Buteo swainsoni*), mountain plover (*Charadrius montanus*), northern harrier, white-tailed kite, loggerhead shrike, Suisun song sparrow (*Melospiza melodia maxillaris*), yellow-headed blackbird (*Xanthocephalus xanthocephalus*), nesting raptors and birds of prey, and American badger (*Taxidea taxus*).

III. Riparian Habitat and Other Sensitive Natural Communities

a. Proposed Impact

The proposed project may have adverse impacts to sensitive natural communities or riparian habitat.

The BRE (SWCA 2021b) and Table BIO-1 above identify the following sensitive natural communities in the BSA: drainage ditches (as seasonal wetland/freshwater marsh), coastal brackish marsh, seasonal wetlands, and freshwater marsh), and alkali meadow. Sensitive vegetation alliances of conservation concern (*Centromadia parryi* Herbaceous Alliance; *Cressa truxillensis* – *Distichlis spicata* Herbaceous Alliance; and *Frankenia salina* Herbaceous Alliance) occur within those communities. The coastal brackish marsh and alkali meadow will be avoided and preserved. The *Cressa truxillensis* - *Distichlis spicata* and *Frankenia salina* alliances occur only in the southernmost seasonal wetlands (located in or south of the alkali meadow) and will be avoided in the preserve. The *Centromadia parryi* Herbaceous Alliance is found within the seasonal wetlands and valley floor grassland communities in the project area. Based on the results of the 2021 botanical surveys it is estimated that between four and five million plants in this vegetation alliance will be impacted within the project footprint. A few riparian trees along the large north-south aligned drainage ditches (220 square feet) will also be removed during project construction.

b. Proposed Mitigation

The Project proposes the following mitigation measures to minimize potential adverse impacts to sensitive natural communities:

- BIO-1a: Pappose tarplant (*Centromadia parryi*) mitigation.
- BIO-1b: Contra Costa goldfields mitigation.
- BIO-3 provides mitigation for aquatic resource impacts (drainage ditches (including woody riparian), seasonal wetlands, and freshwater marsh).

IV. Protected Wetlands and Waters

a. Proposed Impact

The proposed project may have a substantial adverse impact on federally or state protected wetlands and waters.

An aquatic resources delineation of the project area was conducted in 2020 and 2021. The Aquatic Resources Delineation Report was submitted to the San Francisco District of the U.S. Army Corps of Engineers (USACE) for verification. A field verification with the USACE was held on October 28th, 2021, and the delineation map then updated to reflect field-verified wetland boundaries. The USACE verified the aquatic resource boundaries in a Preliminary Jurisdictional Determination letter dated January 31, 2022. Acreages and boundaries analyzed in this document (and in the BRE) reflect the field-verified boundaries.

The proposed project would fill a total of approximately 1.20 acres of drainage ditch (including 0.54 acres of seasonal wetland in Drainage Ditch DD-02), approximately 4.50 acres of seasonal wetland (not including the 0.54 acre of seasonal wetland in Drainage Ditch DD-02). The proposed impacts are summarized in Table Bio-1 and shown on Figure Bio-1.

Mitigation Measure BIO-3 requires the applicant to obtain all requisite authorization from agencies with jurisdiction over resources within the project site, and to meet a minimum performance standard (requiring one acre of restoration (or other mitigation method listed in BIO-3) for each acre impacted by development). Such approvals from other agencies may include Section 404 permit(s), Section 1602 Lake and Stream Alteration Agreement(s), and Section 401 Water Quality Certification(s). BIO-3 ensures that there would be no net loss of aquatic habitats, and jurisdictional waters and reduce impacts to less than significant.

b. Proposed Mitigation

The Project proposes the following mitigation measure to minimize potential adverse impacts to federally or state protected wetlands and waters:

BIO-3: Prior to issuance of grading permits for activities that impact protected aquatic resources, the project applicant shall obtain all requisite authorizations from agencies with jurisdiction over the affected aquatic resources. Such agencies will include, but may not be limited to, the United States Army Corps of Engineers, the California Department of Fish and Wildlife, and the San Francisco Bay Regional Water Quality Control Board. Regardless of agency permit requirements, impacted resources shall be offset through onsite restoration, offsite restoration, purchase of credits at an agency-approved mitigation bank in the region,

or another agency-approved habitat mitigation method (e.g., re-establishment, preservation, etc.) at no less than a 1:1 ratio. This ratio applies to wetlands and waters subject to federal and/or state jurisdiction. Such mitigation may simultaneously satisfy other project mitigation requirements for sensitive species or critical habitat (e.g. vernal pool fairy shrimp, vernal pool tadpole shrimp, California tiger salamander, Swainson's hawk, and burrowing owl) if the applicant demonstrates to the City and applicable resource agencies that the mitigation lands provide suitable habitat and meet all other mitigation specifications.

V. Wildlife Movement, Corridors, and Nursery Sites

a. Proposed Impact

The proposed project would not have substantial impacts to fish or wildlife movement, corridors, or nursery sites.

While not approved, the draft HCP recognizes a key wildlife corridor linking Jepson-Prairie and the Suisun Marsh (Corridor #6 on HCP Figure 4-2, Key Corridors within the Plan Area) on the south side of Highway 12. The areas affected by the project are not in the corridor and the project would not affect connectivity between Jepson Prairie and the Suisun Marsh. The Terrestrial Connectivity, Areas of Conservation Emphasis (ACE; CDFW Bios Layer 2021) dataset identifies the area that would be affected by the project as Connectivity Rank 3 (Connections with Implementation Flexibility). The affected habitat is not considered an irreplaceable and essential corridor, nor a conservation planning linkage.

South of the Project, SR-12 separates the project site from Suisun Marsh and is a barrier to wildlife movement and affects hydrology to and from the project site. Wildlife movement across SR-12 is constrained due to the continuous median concrete barrier rail that separates the two lanes of traffic. The two drainages are connected through relatively small, hard bottomed culverts that are normally not passable. The soft-bottomed Union Creek crossing approximately a quarter mile to the east is a more likely crossing location for smaller animals. The high traffic volume on the highway, combined with higher quality habitat to the south and east, there are no known or mapped wildlife corridors to and from the project site. Given the existing barriers and the preservation of open space on the project site, the proposed project would not have significant adverse effects on wildlife movement. There are no fish or wildlife nursery sites known or likely to occur within the proposed impact area. Impacts would be less than significant.

The BSA is located in the Pacific Flyway. The Suisun Marsh, including the marsh area in the southern portion of the BSA, is important habitat that provides a critical stopover for migratory birds. The marsh in the southern portion of the BSA is a small part of the 116,000-acre Suisun Marsh. The proposed project area has disturbed seasonal wetland and agricultural field/grassland habitats that provide limited stopover habitat for migratory birds. Waterfowl and shorebirds were not observed in the seasonal wetlands or agricultural field/grassland in the proposed project area during baseline surveys (waterfowl and shorebirds were observed primarily in association with the coastal brackish marsh adjacent to SR 12, about 1000 feet south of the proposed project). The BSA is physically separated from the Suisun Marsh by SR 12. The proposed project is expected to have negligible impacts on the Pacific Flyway and regional bird movements.

Bird strikes with waterfowl are a concern at Travis AFB and are known as Bird Aircraft Strike Hazards (BASH). This is due to the location of Travis AFB within the Pacific Flyway. The area around Travis AFB is also a wintering area for a large population of ducks and abundant populations of geese and swans. The various large marsh complexes south and west of the BSA account for most of the waterfowl movement in the region. The local landfills and hunting clubs also attract neotropical migrants and waterfowl, further complicating the issue. A wildlife hazard assessment memorandum prepared in March 2021 by AECOM biologists concluded that,

...the construction and development associated with the Suisun Logistics Center would not increase the activity or presence of birds or other wildlife. Therefore, the project would not present a hazard to TAFB flight operations. We expect overall wildlife activity on the property to remain at or below current levels, based on our understanding of the planned development and assessment of existing habitat.

In comparison to the existing habitat and regional attractants for various bird species within the Pacific Flyway, no noticeable difference in the local bird population or its movements will occur because of the proposed project and is not expected to change the BASH risk at Travis AFB.

b. Proposed Mitigation

No mitigation is necessary specific to this potential impact. Mitigation Measures BIO-1a, 1b, 2h, and 3 will provide habitat mitigation for potential loss of rare plants, Swainson's hawk foraging habitat, and wetlands and waters that will compensate for the loss of the migratory bird habitats impacted in the project area.

VI. Local Policies and Ordinances Protecting Biological Resources

a. Proposed Impact

The proposed project may conflict with applicable provisions of Local Policies and Ordinances Protecting Biological Resources.

The City of Suisun City 2035 General Plan, adopted May 5, 2015, sets forth the following goals, objectives, and policies relevant to biological resources:

- **Goal OSC-1:** Protect wildlife habitat and movement corridors through the preservation of open space.
- **Objective OSC-1:** Increase the number of new developments that preserve and integrate drainages and other wildlife movement into site plans.
- **Policy OSC-1.1:** The City will require biological resources investigations for proposed developments that could adversely affect potential wildlife movement corridors to determine the value and importance of such corridors to daily and/or seasonal movement and dispersal of local wildlife and identify measures to minimize and avoid adverse effects on wildlife movement. Wildlife movement corridors include marshlands, waterways, and other types of corridors that provide for movement and dispersal.

- **Policy OSC-1.2:** New developments in areas with waterways, riparian habitats, and stands of mature trees shall preserve and incorporate those features into project site planning and design, to the greatest extent feasible.
- **Policy OSC-1.3:** New developments shall be designed to protect and preserve natural watercourses and drainage channels to the maximum extent feasible.
- **Policy OSC-1.4:** New development shall preserve and incorporate into site planning natural drainages that could support riparian habitat.
- **Policy OSC-1.8:** Roads, water lines, sewer lines, drainage facilities, and other public facilities constructed to serve development shall be located and designed to avoid substantial impacts to stream courses, associated riparian areas, and wetlands, to the greatest practical extent.
- **Goal OSC-2:** Ensure consistency with Solano Multispecies Habitat Conservation Plan.
- **Objective OSC-2:** New development in the Planning Area supports the conservation objectives of the Solano Multispecies HCP.
- **Policy OSC-2.1:** The City will coordinate environmental review and mitigation requirements with the Solano Multispecies HCP.
- **Policy OSC-2.3:** The City will require that new developments comply with relevant conservation measures detailed within the Conservation Strategy chapter of the Solano Multi- Species HCP, as applicable.

b. Proposed Mitigation

The Project is not inconsistent with an adopted HCP. Regardless, the project proposes Mitigation Measure BIO-5 (described in the section that follows) to allow flexibility with future changes to local policies and ordinances.

VII. Adopted HCP, NCCP, or Other Conservation Plans

a. Proposed Impact

The proposed project may conflict with applicable provisions of the unadopted Solano Habitat Conservation Plan.

The Solano HCP is currently in final administrative draft format (Drafted in October 2012) and has not been adopted by the County and approved by the resource agencies. Thus, at the time of this writing, it is legally non-binding. CEQA normally does not require an analysis of consistency with such a draft, unadopted plan. (See *Chaparral Greens v. City of Chula Vista* (1996) 50 Cal.App.4th 1134, 1145.) Even so, this document addresses the proposed project's consistency with the currently *proposed* Solano HCP because General Plan Goal OSC-2 is to "[e]nsure consistency with Solano Multispecies Habitat Conservation Plan." This Goal, in turn, gave rise to specific policies (OSC-2.1, OSC-2.2, and OSC-2.3) that require compliance with the HCP once it is adopted.

Should the proposed plan be adopted, the HCP will promote the conservation of biologically significant areas while simultaneously allowing urban development and the continuation of ongoing land use activities, such as agriculture. The Solano HCP will be a 50-year plan designed to create a reserve of connected natural habitats throughout the County. In exchange for protecting the reserve area, the Solano HCP would allow for the "take" of

threatened, endangered, rare, and covered plant and animal species and habitats as part of “covered activities” in non-reserve areas.

The project site is located within the HCP-designated *High Value Conservation Area Subarea 1F: Potrero Hills/Lower Union Creek/Denverton Creek Contra Costa Goldfields Core Population: High Value Conservation Criteria 1, 2, 3, 4, 5, 6, and 7 (4,990 ac)*. The project site is located in Covered Activity Zone 1 of the proposed HCP, with impacts to covered species and habitats to be fully mitigated at off-site preserve areas by providing fee payments to preserve habitat elsewhere in the plan boundaries.

Mitigation Measure BIO-5 requires that, in the event the Solano HCP is adopted prior to the beginning of construction, the applicant may choose to participate in the HCP. Participation would require payment of mitigation fees to the City of Suisun City in accordance with the provisions of the plan. Participation would require the project to implement the mitigation measures outlined in the HCP. Mitigation Measures BIO-1, and BIO-2a to BIO-2e will also serve to reduce impacts to habitat and both covered and non-covered species under the HCP. With the implementation of HCP mitigation, impacts would be reduced to a level of less than significant.

b. Proposed Mitigation

It is not an inconsistency with the HCP should the applicant decline to obtain coverage under the HCP if the HCP is adopted after the project EIR. The Project proposes the following mitigation measures to minimize potential conflicts with the Solano HCP:

BIO-5: The applicant may voluntarily seek coverage under the Solano Habitat Conservation Plan (HCP) if the HCP is adopted by the County and participating local jurisdictions, approved by the resource agencies, and the fee program has been established prior to the issuance of the grading permit. If the applicant seeks coverage, the applicant would be required to pay mitigation fees and/or dedicate land to the City of Suisun City in accordance with the provisions of the HCP, and the applicant would be required to comply with the applicable provisions of the HCP that pertain to plant and wildlife surveys and mitigation requirements. If the project has permit conditions that require the purchase of mitigation and/or conservation credits from a USFWS approved mitigation bank, the resource agencies may allow the applicant to provide fee payments to preserve habitat elsewhere in the plan boundaries.

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Solano County Water Agency (SCWA). October 2012. Solano Habitat Conservation Plan Volume I, Public Draft.

Swainson’s Hawk Technical Advisory Committee, May 31, 2000. *Recommended Timing and Methodology for Swainson’s Hawk Nesting Surveys In California’s Central Valley.*

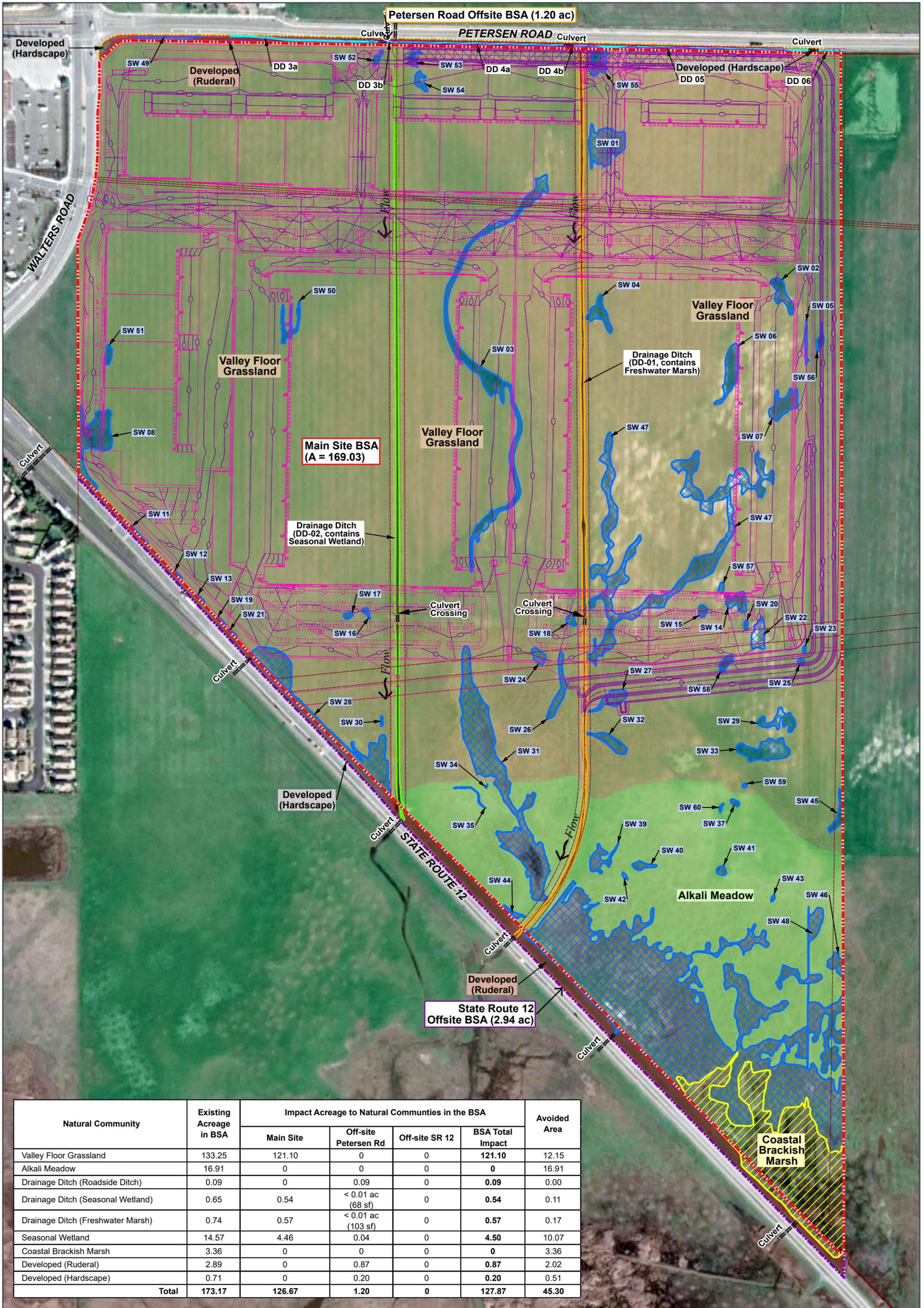
SWCA Environmental Consultants (SWCA). April 2022. Technical Memorandum: 2022 Spring Botanical Survey Results for the Suisun Logistics Center Project, Solano County, California. Prepared for Buzz Oates Enterprises. SWCA Environmental Consultants, Sacramento, CA.

SWCA Environmental Consultants (SWCA). September 2021 (2021a). Aquatic resources delineation report for the Suisun Logistics Project. Prepared for Buzz Oates Enterprises. SWCA Environmental Consultants, Sacramento, CA.

SWCA Environmental Consultants (SWCA). October 2021 (2021b). Biological Resources Evaluation and Botanical Inventory Report for the Suisun Logistics Project. Prepared for Buzz Oates Enterprises. SWCA Environmental Consultants, Sacramento, CA.

FIGURE Bio-1

Impacts to Natural Communities



Natural Community	Existing Acreage in BSA	Impact Acreage to Natural Communities in the BSA				Avoided Area
		Main Site	Off-site Petersen Rd	Off-site SR 12	BSA Total Impact	
Valley Floor Grassland	133.25	121.10	0	0	121.10	12.15
Alkali Meadow	16.91	0	0	0	0	16.91
Drainage Ditch (Roadside Ditch)	0.09	0	0.09	0	0.09	0.00
Drainage Ditch (Seasonal Wetland)	0.65	0.54	< 0.01 ac (68 sf)	0	0.54	0.11
Drainage Ditch (Freshwater Marsh)	0.74	0.57	< 0.01 ac (103 sf)	0	0.57	0.17
Seasonal Wetland	14.57	4.46	0.04	0	4.50	10.07
Coastal Brackish Marsh	3.36	0	0	0	0	3.36
Developed (Ruderal)	2.89	0	0.87	0	0.87	2.02
Developed (Hardscape)	0.71	0	0.20	0	0.20	0.51
Total	173.17	126.67	1.20	0	127.87	45.30

SUISUN LOGISTICS CENTER PROJECT
Impacts to Natural Communities

- Main Site Biological Study Area (BSA; 169.03 ac)
- Petersen Road Offsite BSA (1.20 ac)
- State Route 12 Offsite BSA (2.94 ac)
- Culvert

- Natural Communities**
- Drainage Ditch (Roadside Ditch)
 - Drainage Ditch (Seasonal Wetland)
 - Drainage Ditch (Freshwater Marsh)
 - Seasonal Wetland
 - Coastal Brackish Marsh
 - Valley Floor Grassland
 - Alkali Meadow
 - Developed (Ruderal)
 - Developed (Hardscape)

- Project Features**
- Project Footprint / Permanent Impact
 - Grading and Drainage Improvements
 - Proposed Site Improvements
 - Utility and Drainage Easements

Solano County, CA
NAD 1983 StatePlane California II FIPS 0402 Feet
38.2375°N 121.9837°W

Aerial Photograph: 7 February 2020, 20200 Maxar Technologies Imagery Google Earth Pro

Updated: 1/25/2022
Project No. 66497
Layout: gabrychProperty_BioresImpact(11x17P)
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0 30 60 Meters

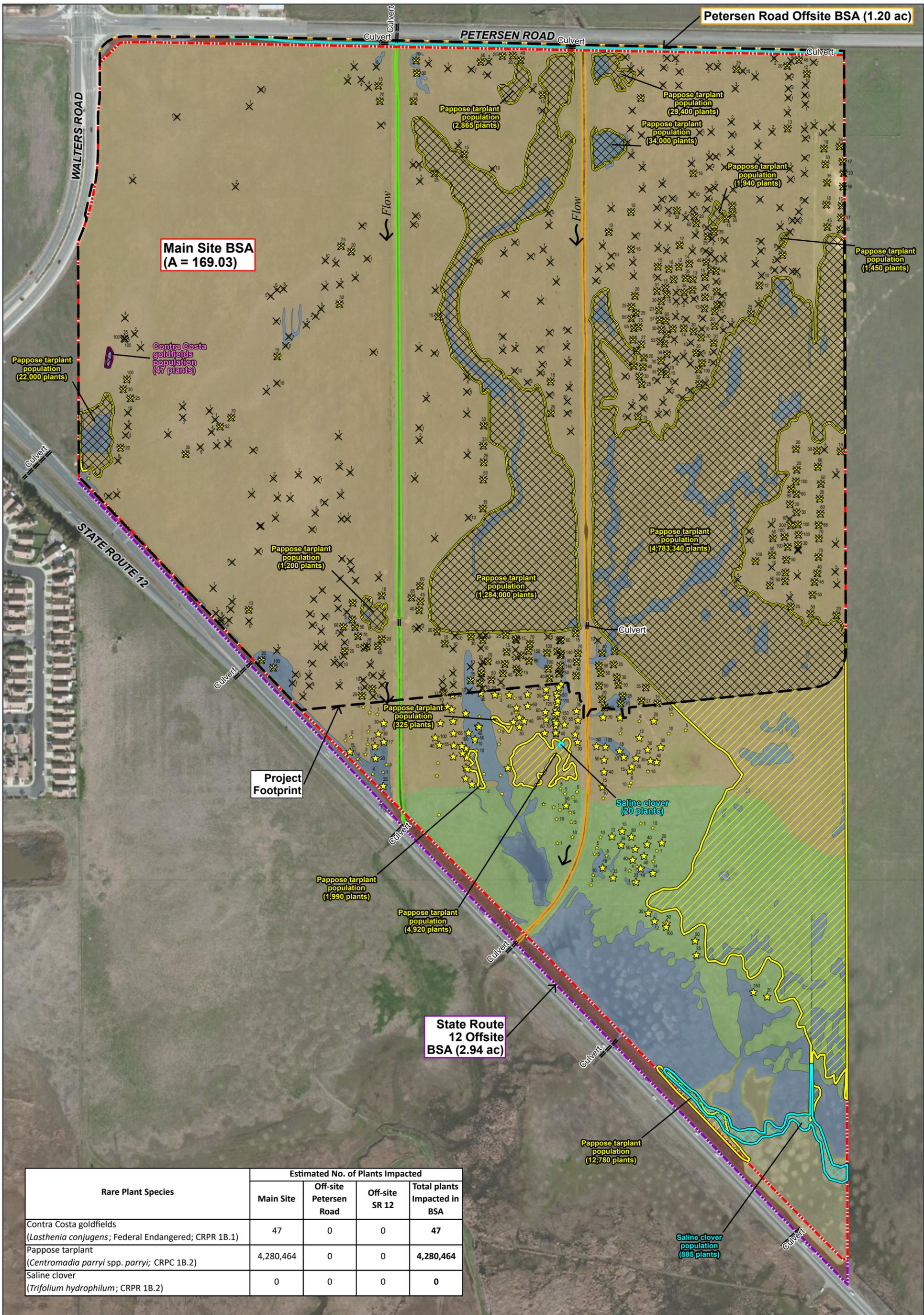
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SWCA
ENVIRONMENTAL CONSULTANTS

FIGURE Bio-2

Impacts to Rare Plants



Rare Plant Species	Estimated No. of Plants Impacted			
	Main Site	Off-site Petersen Road	Off-site SR 12	Total plants Impacted in BSA
Contra Costa goldfields (<i>Lasthenia conjugens</i> ; Federal Endangered; CRPR 1B.1)	47	0	0	47
Pappose tarplant (<i>Centromadia parryi</i> spp. <i>parryi</i> ; CRPC 1B.2)	4,280,464	0	0	4,280,464
Saline clover (<i>Trifolium hydrophilum</i> ; CRPR 1B.2)	0	0	0	0

SUISUN LOGISTICS CENTER PROJECT

Impacts to Rare Plants Observed in 2021 and 2022

Legend

- Main Site Biological Study Area (BSA; 169.03 ac)
- Petersen Road Offsite BSA (1.20 ac)
- State Route 12 Offsite BSA (2.94 ac)
- Culvert
- Project Footprint

Natural Communities

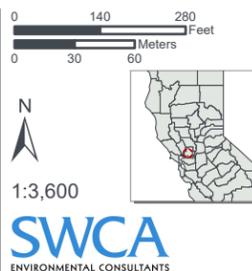
- Drainage Ditch (Roadside Ditch)
- Drainage Ditch (Seasonal Wetland)
- Drainage Ditch (Freshwater Marsh)
- Seasonal Wetland
- Coastal Brackish Marsh
- Valley Floor Grassland
- Alkali Meadow
- Developed (Hardscape)
- Developed (Ruderal)

Rare Plants

- Pappose tarplant population
- Saline Clover plant population
- Contra Costa goldfields population
- ★ Pappose tarplant location point (≤ 10 plants)
- ☆ Pappose tarplant location point (≥ 11 plants)
- Saline clover location point (20 plants)
- ✕ Impact to Plant Point
- ⊠ Impact to Plant Polygon

Solano County, CA
 NAD 1983 StatePlane California II FIPS 0402 Feet
 38.2375°N 121.9837°W

Aerial Photograph: 7 February 2020, 2020 Maxar Technologies Imagery, Google Earth Pro
 Updated: 5/12/2022
 Project No. 66497
 Layout: 6497_gabrychProperty_BotanImpc22(11x17P)
 Aprx: 66497_gabrychProperty



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C.3 - Updated Addendum to Technical Memorandum

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Huffman-Broadway Group, Inc.

ENVIRONMENTAL REGULATORY CONSULTANTS

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April 20, 2023

Sent Via Email

Joe Livaich
Vice President, Planning and Preconstruction Services
Buzz Oates Construction, inc.
555 Capitol Mall, Suite 900
Sacramento, CA 95814

Subject: Updated Addendum to SWCA's Technical Memorandum titled "*Biological Impacts and Proposed Mitigation Measures for the Suisun logistics Center Project, Solano County, California*" dated May 31, 2022.

Dear Mr. Livaich,

This addendum updates specific proposed mitigation measures and wetland and rare plant impact figures provided in SWCA's Technical Memorandum titled "*Biological Impacts and Proposed Mitigation Measures for the Suisun logistics Center Project, Solano County, California*" dated May 31, 2022 (referenced herein as the Technical Memorandum). In general, the updates are based on the biological impacts assessment outlined in the Technical Memorandum, updated biological survey dates, and recent comments by agencies on mitigation measures related to nesting bird surveys and buffers. Mitigation measures BIO-1a and 1b were modified, BIO-2a-f were modified and BIO-2g-h were added, and BIO-3 was changed to BIO-3a and 3b. In addition, minor updates were made to natural community and rare plants impacts and preservation based on updates to the Project Site boundary compared to the area presented in the Technical Memorandum referred to as the Biological Study Area or BSA. Refer to Exhibit 1, Figures 1-5 for updated figures and impact and preservation tables.

The Project Site consists of approximately 170.31 acres which includes the development area and open space area. The development area is approximately 127.52 acres and includes improvements to Peterson Road and a 100-foot storm drain easement which runs along the eastern boundary and a portion of the southern boundary within an approximately 45 acre open space area. The 45 acre open space area includes nearly 42.79 acres of unimpacted habitat and a portion of the development areas 100-foot storm drain easement which encompasses approximately 2.21 acres. Impacted and preserved Natural Community habitat can be found in Figure 3 and impacts and preserved rare plants are shown on Figure 4. The entire 127.52 acre

development area occurs in federal designated critical habitat subunit 4c for Contra Costa goldfields. Approximately 126.89 acres of the development area also occurs in federal designated critical habitat for vernal pool fairy shrimp and tadpole shrimp and approximately 52.05 acres falls within conservancy fairy shrimp critical habitat as shown on Figure 5.

BIO-1a: *To offset impacts to Pappose tarplant the approximately 4,280,464 pappose tarplant plants occupying approximately 29.9 acres, at a minimum, the application shall implement the following mitigation measures.*

1. *The applicant shall preserve the approximately 14-acres of habitat occupied by approximately 1,916,215 pappose tarplant plants on the 45-acre open space area;*
2. *Prior to issuance of a grading permit, the project applicant shall retain a qualified botanist/biologist to prepare a Pappose Tarplant Mitigation and Monitoring Plan (PTMMP). A qualified botanist/biologist would need a 4- year college degree in wildlife biology or related environmental sciences, a minimum of 2 years of experience conducting protocol rare plant surveys, and experience with identification of Pappose Tarplant.*
3. *The PTMMP shall include at a minimum:*
 - *Seedbank-salvage procedure/s;*
 - *Standards for locating areas on the 45-acre open space area to establish new populations and/or to augment existing populations using the salvaged seed;*
 - *The plan shall set forth a minimum performance standard within the 45-acre open space area which shows a continued increase in number of plants and absolute cover of plants over the monitoring period.*
 - *Monitoring to include focused surveys for a minimum of 5 years over a 10 year monitoring period to document if the PTMMP increases the overall pappose tarplant population number and acreage on the 45-acre open space area. Focused surveys shall be implemented in Years 1-2, 5, 8, and year 10.*
 - *Prepare a letter report documenting annual monitoring results and submit them to the City by December of each monitoring year.*
4. *Prior to the implementation of the PTMMP, the qualified biologist shall contact organizations that may have interest in salvaged pappose tarplant seed to implement offsite restoration, habitat enhancement, or research for the pappose tarplant. Organizations the qualified biologist shall contact may include for-profit organizations such as a mitigation bank, or non-profits such as the Solano Land Trust, California Native Plant Society or University botanical departments. If an organization requests salvaged pappose tarplant seed, the applicant shall provide any excess salvaged pappose tarplant seed to the organization.*
5. *Currently there are no mitigation banks that offer pappose tarplant preservation credits. Prior to the start of construction if a mitigation bank offers pappose tarplant preservation credits or the upland or wetland mitigation bank credits available are occupied with pappose tarplant, the applicant may elect to purchase credits equivalent to approximately*

15.9 acres of occupied habitat and not implement the PTMMP, should such credits become available.

These mitigation measures will be effective in preserving 14 acres of occupied pappose transplant habitat on the 45-acre open space area, and implementation of the PTMMP will be effective in increasing the overall number and acreage of pappose tarplant on the 45-acre open space area. These mitigation measures may not be effective in offsetting the remaining 15.9 acres of the 29.9 acre of occupied pappose tarplant habitat impacted. There is uncertainty that a for-profit organizations or non-profit would be willing to accept salvaged seed to implement offsite restoration, habitat enhancement, or research to offset the unmitigated 15.9 acres of occupied habitat, or that a mitigation bank will have pappose tarplant credits available prior to the start of construction.

BIO-1b: *The applicant shall fully avoid Contra Costa goldfield plants and occupied Contra Costa goldfield habitat. Full avoidance shall include a setback of at least 50 feet from all permanent and temporary project impacts. If the applicant cannot fully avoid impacts, the applicant shall obtain federal Endangered Species Act (ESA) incidental take coverage through a USACE ESA Section 7 consultation process with the USFWS and purchase Contra Costa goldfields preservation credits at a USFWS-approved bank at a minimum ratio of 2:1 for occupied habitat impacted. The term “occupied habitat” is either the extent of the occupied wetland or, if a plant is located in an upland, an area buffered by a 50-ft radius. Based on the SWCA Environmental Consultants botanical survey report titled “2022 Spring Botanical Survey Results for the Suisun Logistics Center Project, Solano County, California” dated April 29, 2022, a seasonal wetland occupying 0.03 acre is the only habitat occupied by Contra Costa goldfields and impacted by the project, therefore a minimum of 0.06 preservation credits must be purchased. Proof of purchase of all required Contra Costa goldfields preservation credits shall be provided to the City prior to issuance of the grading permit.*

If preservation credits for Contra Costa goldfields are not available, the applicant shall prepare and submit a Contra Costa Goldfields Mitigation and Monitoring Plan (CCGMMP) to the USFWS, via the USACE ESA Section 7 consultation process. At minimum, the CCGMMP shall include seedbank-harvesting procedures, locations where the seedbank will be placed in suitable habitat adjacent to the project site, success criteria, and monitoring activities. The plan shall set forth a minimum 1:1 re-establishment rate performance standard of the number of individual Contra Costa goldfields impacted, or occupied habitat as determined by the most recent botanical survey. Monitoring activities shall include five years of annual monitoring of the establishment areas by a qualified botanist/biologist. A qualified botanist/biologist would need a minimum of a 4- year college degree in wildlife biology or related environmental sciences, a minimum of 2 years of experience conducting protocol rare plant surveys, and experience with identification of Contra Costa goldfields. Seedbank salvage activities shall be completed prior to grading activities. The

applicant shall be responsible for implementing the plan, including funding, monitoring, reporting, and performance of any remedial activities required by the plan. In addition the 45-acre open space area within Contra Costa goldfields critical habitat will be protected in perpetuity using a conservation easement.

If during permitting with the USFWS it is determined that additional measures beyond that outlined above are required for impacts to Contra Costa goldfields critical habitat, those measures shall be implemented by the applicant according to the terms of the project's Endangered Species Act incidental take coverage.

BIO-2a: *Helm Biological Consulting (HBC) conducted protocol-level dry-season sampling during 2022 and will be conducting protocol-level wet-season sampling during the 2022/2023 wet season for Conservancy fairy shrimp, vernal pool fairy shrimp, and vernal pool tadpole shrimp to determine the presence/absence of these species within the disturbance area. The protocol surveys are being conducted according to the guidelines established by latest edition of the Survey Guidelines for the Listed Large Branchiopods. The survey will also cover Ricksecker's water scavenger beetle. If Conservancy fairy shrimp, vernal pool fairy shrimp, or vernal pool tadpole shrimp are determined to be present on-site, potential impacts to these species will necessitate ESA consultation with USFWS. At a minimum, the following performance standards shall be satisfied regardless of what USFWS requires through such a consultation. The applicant shall ensure compensation, at a ratio of no less than 1:1 for occupied habitat, of offsite habitat of equal or superior quality to that impacted by the project. Such compensation shall be achieved through the use of conservation easements, mitigation banks, or similar strategies resulting in permanent protection. In addition the 45-acre open space area within vernal pool fairy shrimp, or vernal pool tadpole shrimp critical habitat and the approximately 42 acres of Conservancy fairy shrimp within the 45-acres will be protected in perpetuity using a conservation easement. If acceptable to USFWS, the applicant may preserved lands, or portions thereof, not only for habitat for Conservancy fairy shrimp, vernal pool fairy shrimp, and vernal pool tadpole shrimp, but also for Ricksecker's water scavenger beetle, wetlands preservation, and for habitat for other species for which the City may require offsite preservation (e.g., California tiger salamander and burrowing owl).*

If during permitting with the USFWS it is determined that additional measures beyond that outlined above are required for impacts to critical habitat, those measures shall be implemented by the applicant according to the terms of the project's Endangered Species Act incidental take coverage.

BIO-2b: *Prior to the first ground-disturbing activities, the project applicant may choose to retain a wildlife biologist who poses a valid USFWS Section 10(a)(1)(A) Scientific Permit to conduct focused protocol surveys for California tiger salamander to determine the presence/absence of*

this species within the disturbance area. If the applicant chooses to conduct presence/absence surveys, the protocol surveys shall be conducted according to the guidelines established by USFWS Interim Guidance on Site Assessment and Field Surveys for Determining Presence or a Negative Finding of the California Tiger Salamander October 2003 or latest edition. The applicant may also chose to not conduct focused protocol surveys and assume presence and proceed with consultation and propose conservation/mitigation measures for the proposed effects to habitat.

If the California tiger salamander is determined to be present or is assumed to be present on the project site, the applicant will need to acquire ESA/CESA take permits. At a minimum, the following avoidance, minimization and mitigation measures shall be satisfied. To minimize and avoid impacts to CTS, prior to the start of ground disturbing activities (e.g. grading and grubbing) a temporary wildlife barrier fence shall be installed between the project site and adjacent suitable CTS habitat. The wildlife barrier fence may consist of a silt fence with the bottom edge buried a minimum of 12 inches below the surface and the stakes facing inward toward. To allow CTS to exit the site and not enter the site, one-way funnels or ramps that allow CTS to exit the site and not enter shall be installed every 100 linear feet. To provide cover for CTS moving along the wildlife barrier fence a minimum 24x24 inch ¼ inch thick plywood shall be placed on each side of the silt fence near the exit point. The qualified biologist shall inspect the wildlife barrier and exit device each morning during the initial ground disturbing activities. Once the initial grubbing and grading activities are complete the onsite construction manager will be required to maintain the fence and the qualified biologist will conduct a site inspection a minimum of once a week until the USFWS and CDFW determine the temporary wildlife barrier can be removed. If a CTS is located within the construction site, the qualified biologist shall relocate the species to a burrow offsite adjacent to the project site, and the qualified biologist shall monitor the CTS until it has entered the burrow. Relocation of CTS and handling of injured CTS shall also be conducted in accordance with resource agency protocols and permit requirements. To offset permanent impacts to CTS the applicant shall ensure the preservation of habitat at a ratio of no less than 1:1. Such preservation shall be achieved through the use of conservation easements, mitigation banks, or similar strategies resulting in permanent preservation. If acceptable to USFWS and CDFW, the applicant may use preserved lands, or portions thereof, not only for habitat for California tiger salamander, but also for wetlands preservation and for habitat for other species for which offsite preservation may be required (e.g., vernal pool fairy shrimp, vernal pool tadpole shrimp, burrowing owl, and rare plants). The qualified biologist/s conducting daily monitoring shall be approved by the USFWS and CDFW.

BIO-2c: *Once the temporary wildlife barrier has been installed in accordance with BIO-2b, and no more than 30 days prior to the first ground-disturbing activities, the project applicant shall retain a qualified biologist to conduct a focused survey for northwestern pond turtle to determine presence or absence of this species within a 100-foot radius of the disturbance area. A qualified biologist would need a minimum of a 4-year college degree in wildlife biology or related*

environmental science, familiarity with northwestern pond turtle and its local ecology, and experience conducting surveys for this species. If construction occurs between April 1 and September 30, this survey shall include turtle nests. If a turtle is found within the project site, the qualified biologist shall move the turtle to a location outside of the construction zone to suitable habitat. Suitable habitat may be a den the turtle can move into or a ponded area similar to the habitat the turtle was removed from. If a nest is found within the project site or a 100-foot radius of the project site, construction shall not take place within 100 feet of the nest until the turtles have hatched or the eggs have been moved to an appropriate location determined by the qualified biologist. Construction shall be avoided when adults and hatchlings are overwintering (October 1 to February 28/29), because of the likelihood that turtle adults and juveniles could be present in upland habitats. If construction activities must occur during this time frame, a survey for overwintering locations shall be conducted no more than 14 days prior to construction. If this species is found to be overwintering within the project site, den locations shall be avoided until the area is unoccupied, as determined by a qualified biologist.

A worker awareness program shall be established and implemented prior to construction. The program shall include, at a minimum, species identification, a description of suitable habitat for this species, and measures to implement in the event that this species is found during construction. The program shall be presented to all members of the construction crew.

The qualified wildlife biologist will be present during initial clearing and grubbing to further minimize potential impacts to turtles. In the event that a turtle is found during project implementation, construction activities shall stop until the turtle is moved by the qualified biologist to a location outside the construction zone within suitable habitat. Suitable habitat may be a den the turtle can move into or a ponded area similar to the habitat the turtle was removed from. In the event a nest is located, the area shall be fenced and signs shall be posted to alert the construction crew as to the sensitivity of the habitat in question.

BIO-2d: *Prior to any ground disturbance, pre-construction surveys for burrowing owl shall be conducted within a minimum of 150 meters of the project site. Where the survey area encroaches onto private property not accessible to the public (e.g., fenced in commercial property, residential backyard, etc.), the qualified Biologist shall either contact the property owner for permission to physically access the property or, if permission cannot be obtained within a reasonable time period, conduct a visual survey of adjacent areas by scanning with binoculars or a spotting scope. The pre-construction surveys shall be conducted within 2 weeks prior to the onset of any ground-disturbing activities. Surveys shall be conducted by a qualified biologist following California Department of Fish and Wildlife (CDFW) 2012 staff report survey methods and biologist qualifications to establish the status of burrowing owl on the project site. If no burrowing owls are detected during the preconstruction survey, no further action is necessary. If construction is*

delayed or suspended for more than 30 days after the survey, the area shall be resurveyed in accordance with previously described methods.

If burrowing owl is found to occupy the project site during the nonbreeding season (September 1 to January 31), occupied burrows shall be avoided by establishing a no-disturbance buffer zone of a minimum of 100 feet around the occupied burrow. Buffers may be increased to address site-specific conditions using the impact assessment approach described in the CDFW 2012 staff report. If the qualified Biologist determines the location of an occupied burrow/s may be impacted even with a 100-foot buffer, or the burrow(s) are in a location(s) on the project site where a buffer cannot be established without preventing the proposed project from moving forward, then a passive relocation effort may be instituted to relocate the individual(s) out of harm's way pursuant to a Burrowing Owl Exclusion Plan prepared in accordance with the CDFW 2012 staff report. The applicant shall notify CDFW at least 14 days prior to the implementation of the Burrowing Owl Exclusion Plan.

- *If burrowing owl are found to be present during the breeding season (February 1 to August 31), the proposed project ground-disturbing activities shall follow the CDFW 2012 staff report recommended avoidance protocol whereby occupied burrows shall be avoided with a no-disturbance buffer of between 50 meters and 500 meters depending on time of year and disturbance level, as described in the 2012 CDFW staff report. This breeding season buffer zone shall remain until the young have fledged or an unsuccessful nesting attempt is documented.*
- *If burrowing owls are ultimately found on the site and burrow eviction/relocation of burrowing owls during the non-nesting season is a selected strategy to move forward with the project without direct impacts to burrowing owl individuals, the applicant shall coordinate this effort with CDFW and provide habitat mitigation consistent with the 2012 CDFW Staff Report on burrowing owl.*

BIO-2e: *Pre-construction surveys for nesting Swainson's hawk shall be conducted in the project site vicinity prior to initiation of project construction activities. Surveys shall be conducted by a qualified biologist with 4-year degree in wildlife biology or related science, familiarity with Swainson's hawk and its local ecology, and experience conducting surveys for this species. Surveys shall be conducted in accordance with CDFW's "Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley" (CDFW 2000) to maximize the potential for locating nesting Swainson's hawk and reduce the potential for nest failures due to project activities and/or disturbances. The protocol recommends a preliminary (optional survey) between January and March 20, but required surveys conducted during March 20 to April 5, April 5 to April 20, and June 10 to July 30. In addition to preconstruction surveys, surveys must also be conducted each year following initiation of construction if project activities are delayed or*

discontinued for 7 or more days prior to the first survey period (March 20 to April 5), and are scheduled to recommence construction activities during the second survey period but before August 1. These pre-construction surveys shall include investigation of all potential nesting trees within a half-mile radius around all project activities and shall be completed for at least two survey periods immediately prior to commencement of project construction. Where the survey area encroaches onto private property not accessible to the public (e.g., fenced in commercial property, residential backyard, etc.), the qualified Biologist shall either contact the property owner for permission to physically access the property or, if permission cannot be obtained within a reasonable time period, conduct a visual survey of adjacent areas by scanning with binoculars or a spotting scope.

If no nesting Swainson's hawk are found during the first survey period starting March 20 and extending through April 5, then project construction may commence. If during the second survey (April 5–April 20) Swainson's hawk are found to be nesting in the project vicinity and construction has commenced, it shall be assumed the Swainson's hawk commenced nesting and thus the Swainson's hawk are habituated to the ambient level of noise and disturbance emanating from the project site. If Swainson's hawk are found to be nesting within half-mile of the project site, a non-disturbance buffer shall be established to keep all construction activities a minimum of 0.25 mile from the nest site. No disturbance such as construction or earthmoving activity shall occur within the established buffer zone until it is determined by a qualified biologist that the young have fledged or that the nesting cycle is complete based on monitoring of the active nest by the qualified Biologist. The CDFW shall be consulted regarding the adequacy of the buffer established by the qualified biologist. At that time the necessity for acquiring a Fish and Game Section 2081 Incidental Take Permit (ITP) authorization would be determined. An ITP authorization shall be required if there were a valid concern the project activities would result in the "take" of an adult Swainson's hawk, eggs, or nestlings.

Bio-2f: *Prior to ground disturbance, a pre-construction nesting survey shall be conducted for northern harrier and short-eared owl by a qualified biologist if construction is scheduled during the nesting season (February 1 through September 1). The qualified biologist shall have a 4-year degree in wildlife biology or related science, familiarity with northern harrier and short-eared owl and their local ecology, and experience conducting wildlife surveys. To determine whether northern harrier or short-eared owl is nesting on-site, a qualified biologist(s) shall conduct walking transects through the grassland habitat within the project site and a 500-foot radius from the site searching for northern harrier and short-eared owl nests. Where the survey area encroaches onto private property not accessible to the public (e.g., fenced in commercial property, residential backyard, etc.), the qualified biologist shall either contact the property owner for permission to physically access the property or, if permission cannot be obtained within a reasonable time period, conduct a visual survey of adjacent areas by scanning with binoculars or a spotting scope. An active northern harrier or short-eared owl nest must be protected by implementing a minimum*

500-foot radius buffer zone around the nest marked with orange construction fencing. If an active nest is located outside of the project site, the buffer shall be extended onto the project site and demarcated where it intersects the project site. Size of buffer zone may be increased if the qualified biologist determines the construction activity may result in the abandonment of the nest or impact the health of the fledglings. Factors to consider may include, but are not limited to, the type of construction activity that may occur, physical barriers between the construction site and active nest, behavioral factors, and extent that northern harrier or short-eared owl may have acclimated to the disturbance. No construction or earthmoving activity shall occur within the established buffer zone until it is determined by the qualified biologist that the young have fledged or that the nesting cycle is otherwise determined to be complete based on monitoring of the active nest by a qualified biologist.

Bio-2g: *If construction occurs during the breeding season of migratory and resident birds (February 1 to August 31), a qualified biologist shall conduct a pre-construction breeding bird survey in areas of suitable habitat within 7 days prior to the onset of construction activity. Surveys shall be conducted within the project footprint and 250 feet from the construction limits. Where the survey area encroaches onto private property not accessible to the public (e.g., fenced in commercial property, residential backyard, etc.), the qualified biologist shall either contact the property owner for permission to physically access the property or, if permission cannot be obtained within a reasonable time period, conduct a visual survey of adjacent areas by scanning with binoculars or a spotting scope. If the survey area is found to be absent of nesting birds, no further mitigation would be required. However, if construction activities are delayed by more than 7 days, an additional nesting bird survey shall be performed. If active bird nests are found, appropriate buffer zones shall be established around all active nests to protect nesting adults and their young from direct or indirect impacts related to project construction disturbance. Construction activity within the established buffer zone may only be conducted at the discretion of the qualified biologist. Size of buffer zones shall be determined per recommendations of the qualified biologist based on site conditions and species involved, but typical buffers around active nests are 500 feet for large raptors such as buteos, 250 feet for small raptors such as accipiters, and 100 feet for passerines (songbirds) and other bird species. If an active nest is located outside of the project site, the buffer shall be extended onto the project site and demarcated where it intersects the project site. Buffer zones shall be maintained until it can be documented that either the nest has failed, or the young have fledged. The size of buffer zone may be decreased if nest monitoring by the qualified biologist indicates that work activities are not adversely impacting the nest or may be increased if birds are showing signs of unusual or distressed behavior or the qualified biologist determines that the construction activity may result in the abandonment of the nest or impact the health of the fledglings. Factors to consider may include, but are not limited to, the species involved, type of construction activity that may occur, physical barriers between the construction site and active nest, and behavioral factors. This mitigation measure mitigates potential impacts to nesting bird species of special concern not mentioned in Mitigation Measures*

2d, 2e, and 2f, including white-tailed kite, tricolored blackbird, grasshopper sparrow, and loggerhead shrike.

Bio-2h: A survey by a qualified biologist shall be conducted for American Badger dens no more than seven days prior to any ground-disturbing activity. Surveys shall be conducted within the project footprint and 100 feet from the construction limits. Where the survey area encroaches onto private property not accessible to the public (e.g., fenced in commercial property, residential backyard, etc.), the qualified biologist shall either contact the property owner for permission to physically access the property or conduct a visual survey of adjacent areas by scanning with binoculars or a spotting scope. In the event that an active den is discovered in the surveys area, a minimum 100-foot buffer will be established around the den. The no-disturbance buffer shall be flagged and no ground-disturbing activity will be allowed to occur until it is determined by the qualified biologist that the badgers have dispersed the den. The qualified biologist shall have a 4-year degree in wildlife biology or related science and experience detecting an active badger nest.

BIO-3a: Prior to issuance of grading permits for activities that impact protected aquatic resources, the project applicant shall obtain all requisite authorizations from agencies with jurisdiction over the affected aquatic resources. Such agencies will include, but may not be limited to, the United States Army Corps of Engineers, the United States Fish and Wildlife, the California Department of Fish and Wildlife, and the San Francisco Bay Regional Water Quality Control Board. Regardless of agency permit requirements, impacted resources shall be offset through onsite restoration and establishment within the 45-acre open space area, offsite restoration, purchase of credits at an agency-approved mitigation bank in the region, or another agency-approved habitat mitigation method (e.g., re-establishment, preservation, etc.) at no less than a 1:1 ratio. This ratio applies to wetlands and waters subject to federal and/or state jurisdiction. Such mitigation may simultaneously satisfy other project mitigation requirements for sensitive species or critical habitat (e.g. vernal pool fairy shrimp, vernal pool tadpole shrimp, California tiger salamander, Swainson's hawk, and burrowing owl) if the applicant demonstrates to the City and applicable resource agencies with substantial evidence that the mitigation lands provide suitable habitat and meet all other mitigation specifications.

BIO-3b: If onsite wetland restoration and establishment occurs within the 45-acre open space area, a Wetland Mitigation and Monitoring Plan shall be submitted to the United States Army Corps of Engineers, the California Department of Fish and Wildlife, and the San Francisco Bay Regional Water Quality Control Board for review as part of the process for obtaining a permit from these agencies. The Wetland Mitigation and Monitoring Plan shall be prepared in accordance with the Subpart J—Compensatory Mitigation for Losses of Aquatic Resources outlined in the California State Water Resources Control Board (State Water Board) Procedures, and in accordance with the State Water Board Implementation Guidance dated April 2020, and in

accordance with the United States Army Corps of Engineers (USACE) Compensatory Mitigation Rule (33 Code of Federal Regulations Part 332).

The basic objective of the Wetland Mitigation and Monitoring Plan is to ensure that project wetland impacts, and compensatory mitigation proposed to offset the wetland impacts, shall provide a no-net-loss of area of wetlands, and wetlands established/created shall be in-kind to the wetlands impacted to offset the functions of the wetlands impacted. In summary, the Wetland Mitigation and Monitoring Plan shall at a minimum include the following:

- Restore and Establish 4.50 acre of seasonal wetlands, 0.54 acres of seasonal wetland associated with the ditch, 0.57 acres freshwater marsh drainage ditch, and 0.09 acre of unvegetated roadside ditch in-kind to the impacted aquatic resources at a minimum 1:1 ratio.*
- Provide financial assurances to ensure a high level of confidence that the compensatory mitigation shall be successfully completed, in accordance with applicable performance standards in the Plan.*
- Design performance standards to assess whether the Wetland Mitigation and Monitoring Plan is achieving the overall objectives, so that it can be objectively evaluated to determine whether it is developing into the desired resource type (e.g., seasonal wetland, freshwater marsh), and attaining any other applicable metrics such as acres, number of native plant species, water saturation and/or ponding depth and duration, etc.*
- Monitor the site for the duration necessary to determine whether the Wetland Mitigation and Monitoring Plan is meeting the performance standards of the Plan.*
- Protect the approximately 45-acre open space area in perpetuity using a conservation easement, and provide an endowment sufficient to fund the Long-Term Management Plan.*
- An overall assessment of the condition of the wetlands permanently impacted by the proposed project shall be conducted using the California Rapid Assessment Method (CRAM) for depressional wetlands, or a hybrid approach based on CRAM. Each similar wetland type that may be impacted shall be assessed to describe the floristic community and record the native and non-native dominant plants within the wetlands. Physical structure such as topographic complexity and physical features that may provide habitat for aquatic species (e.g., boulders, woody debris etc.) shall be recorded and used to design the created/established wetlands. The purpose of this assessment is to ensure the design of the wetlands provide habitat that is similar to the wetlands being impacted to ensure the impacted wetlands are mitigated in-kind.*

If you have any questions or need additional information please call or email me at 415-385-4105 or rperrera@h-bgroup.com.

Sincerely,

Robert F.
Perrera
Robert F. Perrera
Wetlands Regulatory Scientist

Digitally signed by
Robert F. Perrera
Date: 2023.04.20
15:18:43 -07'00'

Enclosure

Exhibit 1. Figures 1-5

Exhibit 2. Technical Memorandum titled "*Biological Impacts and Proposed Mitigation Measures for the Suisun Logistics Center Project, Solano County, California*" dated May 31, 2022

Exhibit 1

Figures 1-5

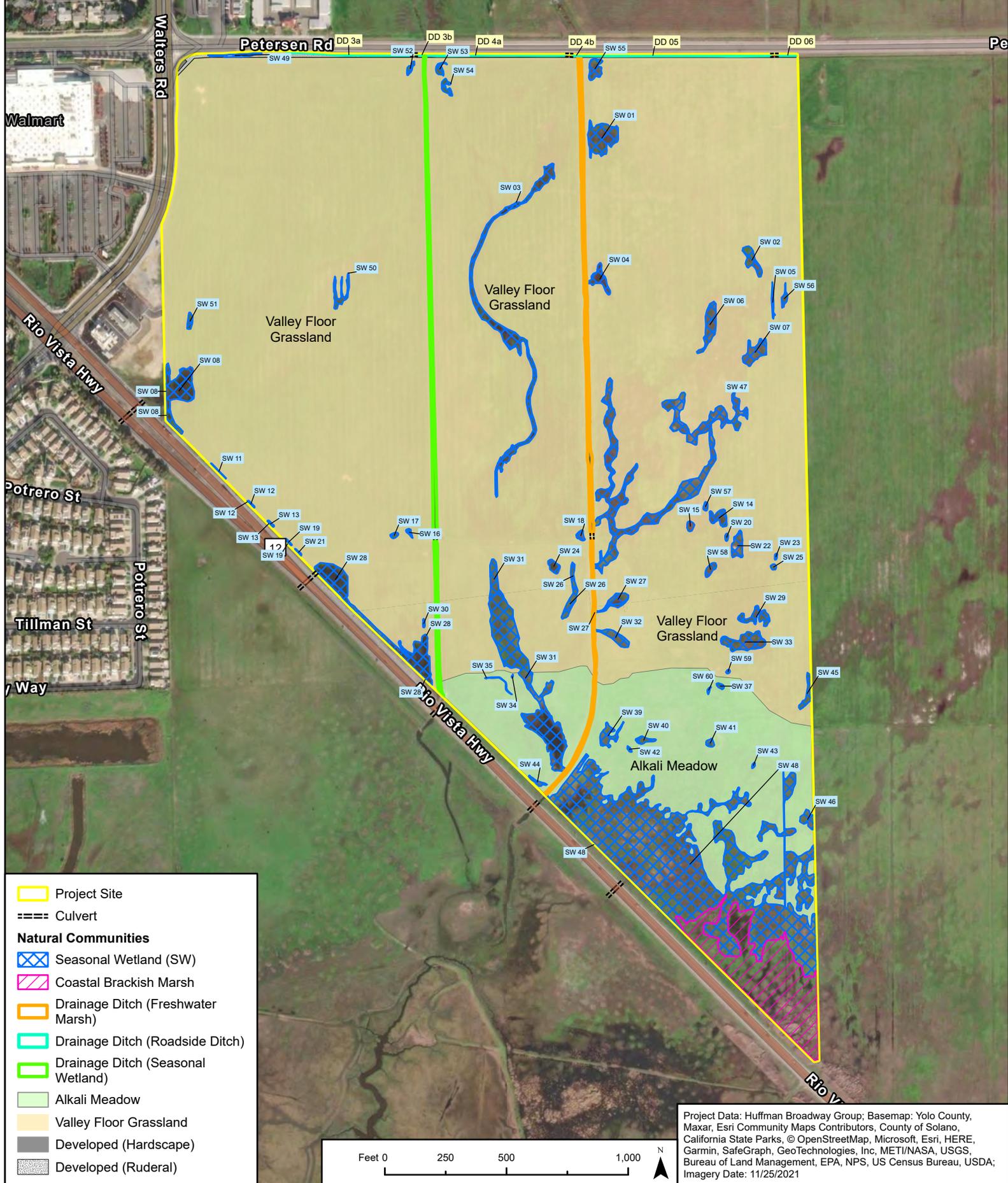


Figure 1. Natural Communities
 Suisun Logistic Center Project
 Solano County, California

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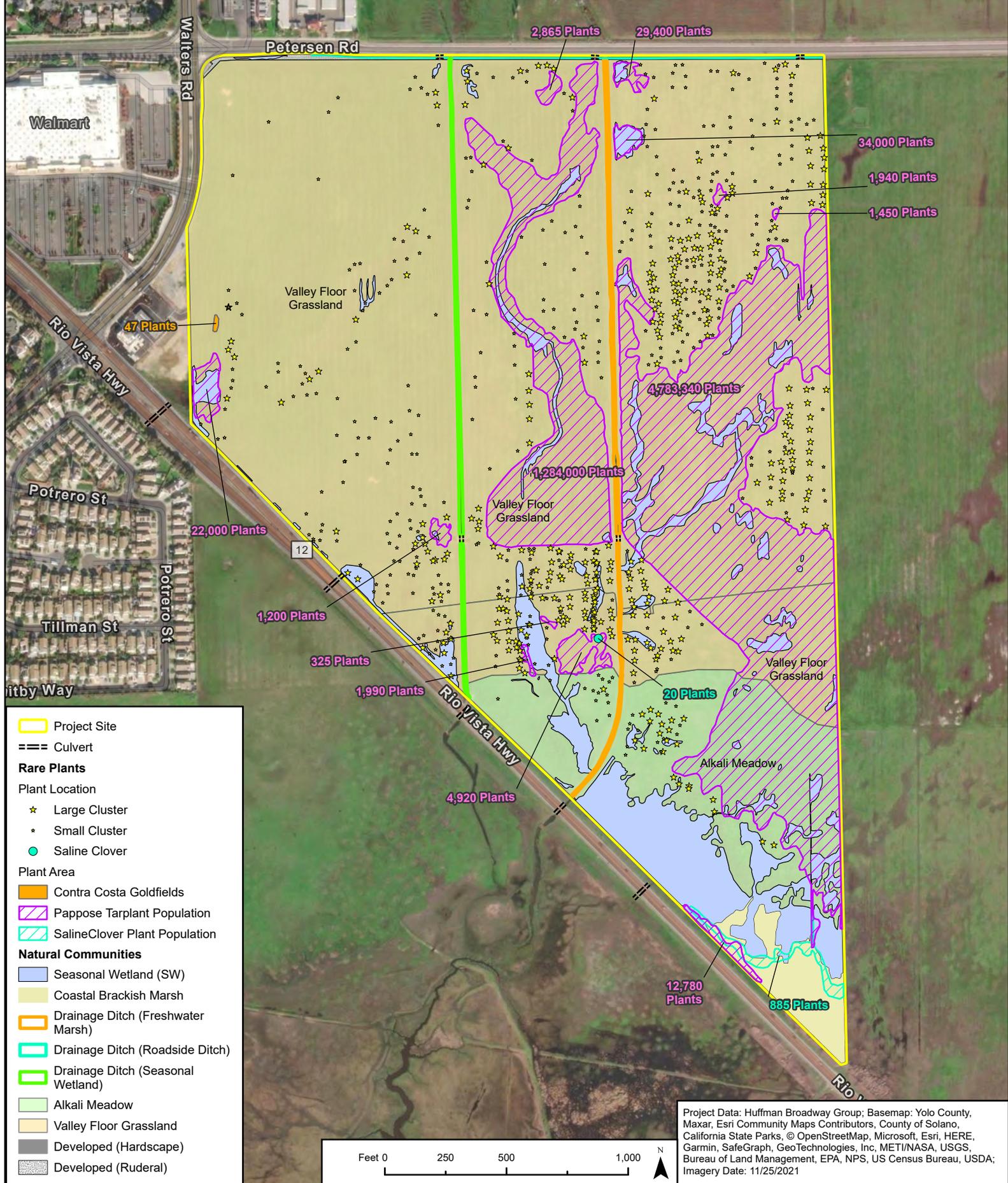
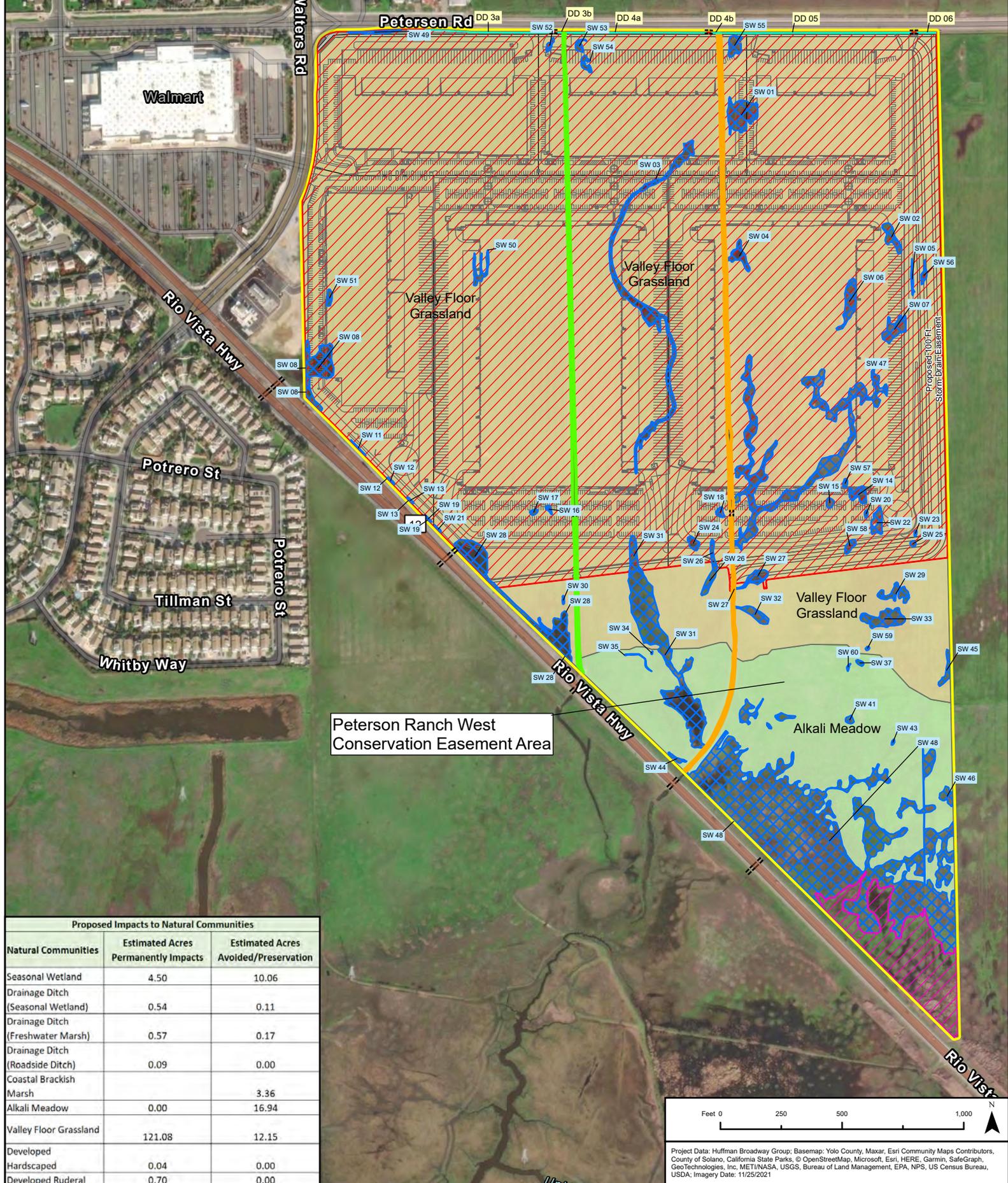


Figure 2. Rare Plant Locations
 Suisun Logistic Center Project
 Solano County, California



Proposed Impacts to Natural Communities		
Natural Communities	Estimated Acres Permanently Impacts	Estimated Acres Avoided/Preservation
Seasonal Wetland	4.50	10.06
Drainage Ditch (Seasonal Wetland)	0.54	0.11
Drainage Ditch (Freshwater Marsh)	0.57	0.17
Drainage Ditch (Roadside Ditch)	0.09	0.00
Coastal Brackish Marsh		3.36
Alkali Meadow	0.00	16.94
Valley Floor Grassland	121.08	12.15
Developed		
Hardscaped	0.04	0.00
Developed Ruderal	0.70	0.00

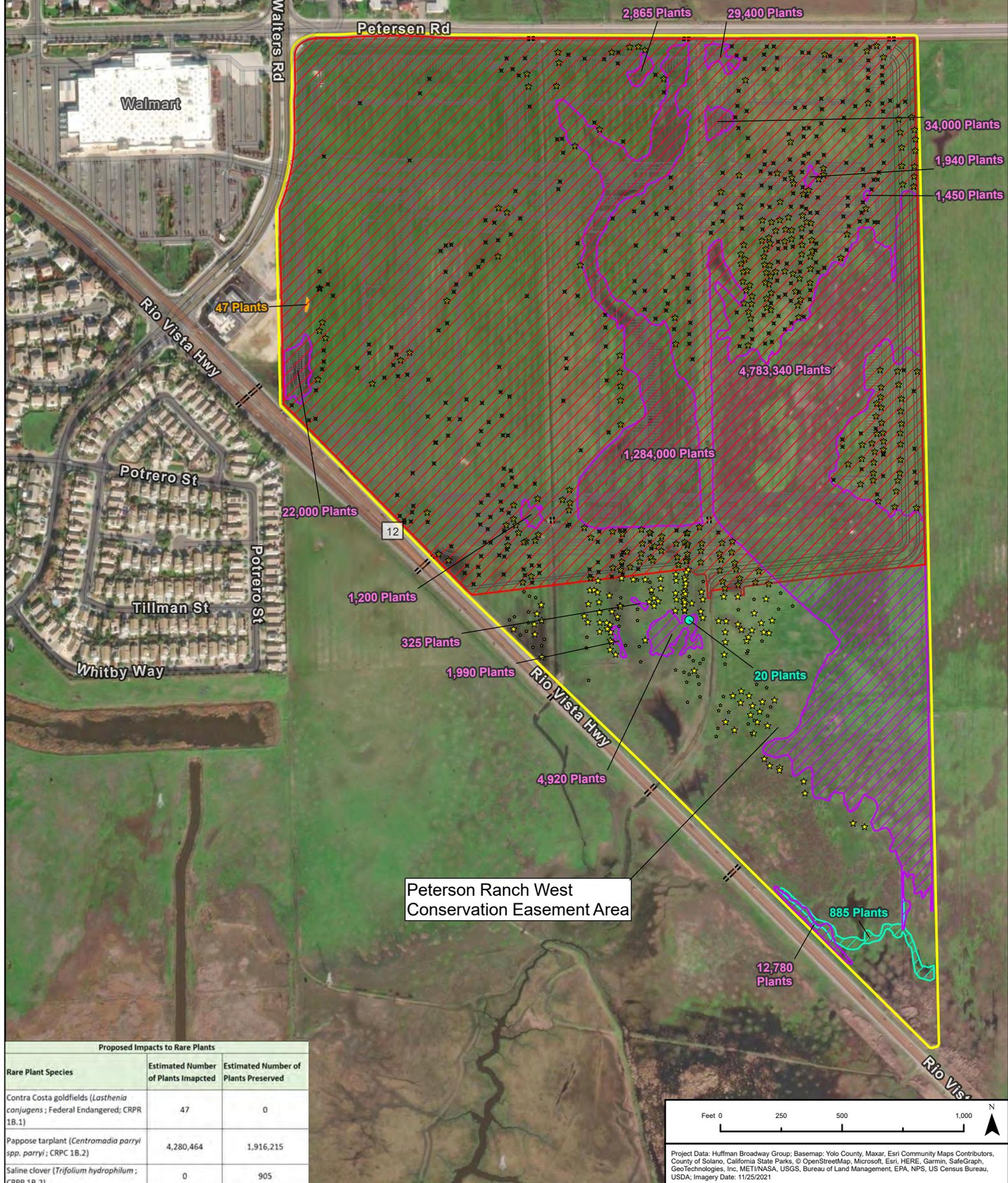


Project Data: Huffman Broadway Group; Basemap: Yolo County, Maxar, Esri Community Maps Contributors, County of Solano, California State Parks, © OpenStreetMap, Microsoft, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, US Census Bureau, USDA; Imagery Date: 11/25/2021

Figure 3. Natural Community Impacts
 Suisun Logistic Center Project
 Solano County, California

- Development Area
- Project Site
- Culvert
- Seasonal Wetland (SW)
- Coastal Brackish Marsh
- Drainage Ditch (Freshwater Marsh)
- Drainage Ditch (Roadside Ditch)
- Drainage Ditch (Seasonal Wetland)
- Alkali Meadow
- Valley Floor Grassland
- Developed (Hardscape)
- Developed (Ruderal)

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Proposed Impacts to Rare Plants		
Rare Plant Species	Estimated Number of Plants Impacted	Estimated Number of Plants Preserved
Contra Costa goldfields (<i>Lasthenia conjugens</i> ; Federal Endangered; CRPR 1B.1)	47	0
Pappose tarplant (<i>Centromadia parryi</i> spp. <i>parryi</i> ; CRPC 1B.2)	4,280,464	1,916,215
Saline clover (<i>Trifolium hydrophilum</i> ; CRPR 1B.2)	0	905

Figure 4. Rare Plant Impacts
 Suisun Logistic Center Project
 Solano County, California

Development Area	Rare Plants	Impacted Plant Plant Area
Project Site	Plant Location	Contra Costa Goldfields
Culvert	Large Cluster	Pappose Tarplant Population
	Small Cluster	SalineClover Plant Population
	Saline Clover	

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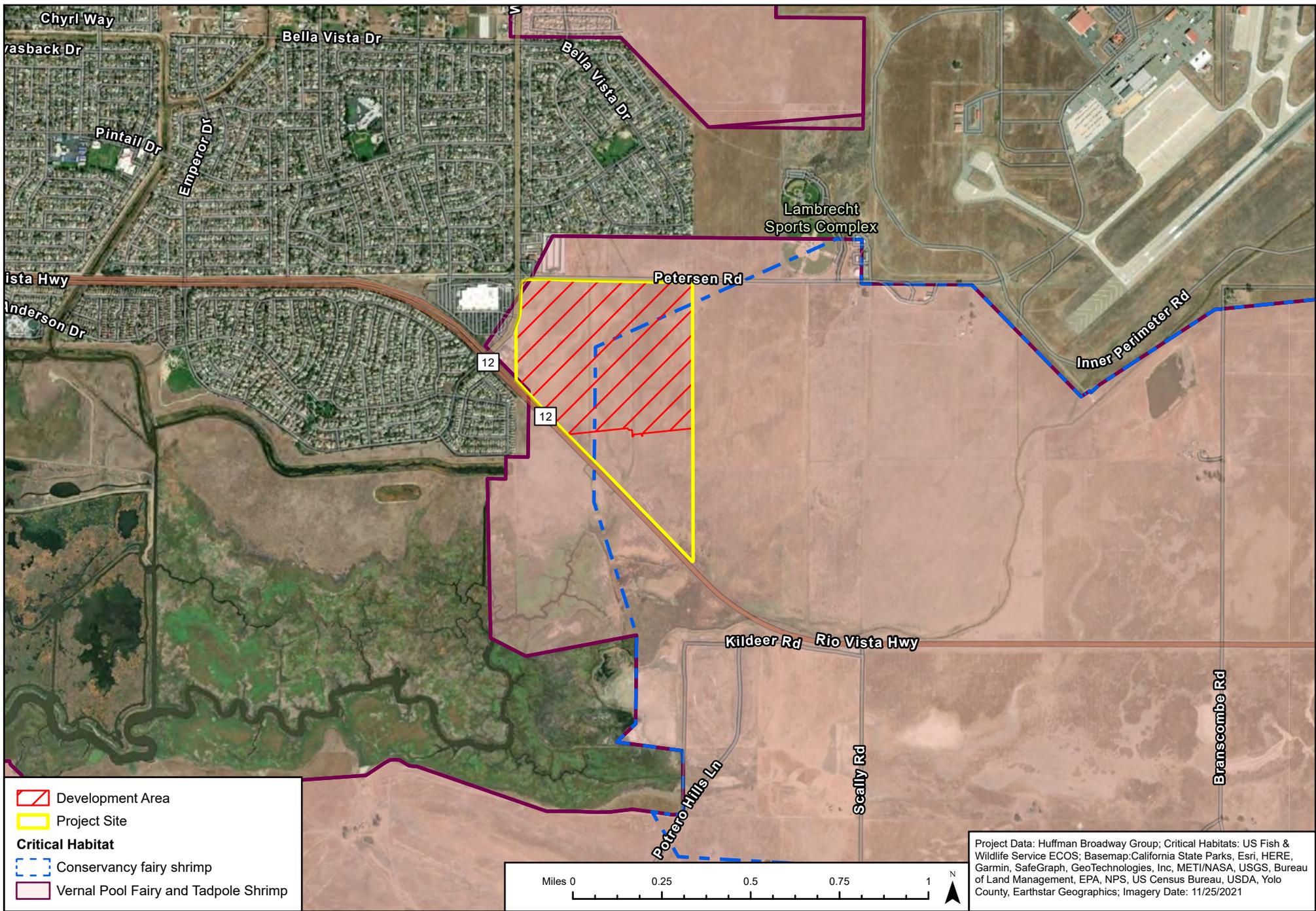


Figure 5. Vernal Pool Fairy Shrimp, Tadpole Shrimp, & Conservancy Fairy Shrimp Critical Habitat

Highway 12 Logistics Center Project
Solano County, California

Huffman-Broadway Group, Inc.
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Exhibit 2

Technical Memorandum titled “*Biological Impacts and Proposed Mitigation Measures for the Suisun logistics Center Project, Solano County, California*” dated May 31, 2022



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TECHNICAL MEMORANDUM

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From: Michael Bower, M.S., Senior Botanist
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Email: Michael.Bower@swca.com

Date: May 31, 2022

Re: Biological Impacts and Proposed Mitigation Measures for the Suisun Logistics Center Project, Solano County, California

INTRODUCTION

This memorandum describes impacts to biological resources resulting from the proposed Suisun Logistics Center Project (Project), and the proposed avoidance and minimization measures and mitigation measures that Suisun City may include in the CEQA document. The approximately 173.17-acre biological study area (BSA) is located southeast of the intersection of Walters and Petersen Road, adjacent to Suisun City in unincorporated Solano County, California. The BSA includes the main site (169.03 acres on APN 0174-190-140), and adjacent road frontage along State Route 12 (2.94 acres) and Petersen Road (1.20 acres). The proposed project consists of six industrial buildings, loading docks, uncovered parking, driveway access from Walters and Petersen Road, bioretention areas and landscaping. The proposed development will impact approximately 127.87 acres. Wetland creation is proposed in the avoided open space area comprising 45 acres (+/-), located immediately south of the proposed development. It is anticipated that between five and ten acres of wetland habitat may be created in the open space to compensate for impacts from this project.

SWCA Environmental Consultants documented baseline biological resources in the BSA in an Aquatic Resources Delineation Report (SWCA 2021a) and Biological Resources Evaluation and Botanical Inventory Report (BRE; SWCA 2021b). General biological surveys and fieldwork for the wetland delineation were conducted from October 2020 through November 2021. The delineation was field verified with the U.S. Army Corps of Engineers on October 28, 2021. Protocol botanical surveys were conducted in March, April, July, and August 2021. Natural communities in the BSA consist of valley floor grassland, alkali meadow, seasonal wetland (subtypes: pool, swale, mesic grassland, alkaline meadow, playa pool), freshwater marsh, coastal brackish marsh, and drainage ditches. The BSA contains potential habitat for 26 special-status wildlife species, 41 special-status plants, and federal designated critical habitat for conservancy fairy shrimp, vernal pool fairy shrimp, vernal pool tadpole shrimp, and Contra Costa goldfields. Biological resources evaluated include species addressed as Covered Species and Special Management Species in the Draft Solano HCP (SCWA 2012).

Proposed impacts to the natural communities are summarized in Table Bio-1 and shown on Figure Bio-2. Approximately 127.87 acres would be permanently impacted. The project impacts valley floor grassland, drainage ditch (including portions of the drainage ditch mapped as seasonal wetland/freshwater marsh), seasonal wetland, developed (ruderal) land, and developed (hardscape) land.

Table Bio-1. Proposed Impacts to Natural Communities

Natural Community	Existing Acreage In BSA	Impacts to Natural Communities (acres)				Avoided Acreage
		Main Site	Offsite - Petersen Rd	Offsite - SR 12	BSA Total Impact ¹	
Valley Floor Grassland	133.25	121.10	0	0	121.10	12.15
Alkali Meadow	16.91	0	0	0	0	16.91
Drainage Ditch (Roadside Ditch)	0.09	0	0.09	0	0.09	0
Drainage Ditch (Seasonal Wetland)	0.65	0.54	< 0.01 ac (68 sf)	0	0.54	0.11
Drainage Ditch (Freshwater Marsh)	0.74	0.57	< 0.01 ac (103 sf)	0	0.57	0.17
Seasonal Wetland	14.57	4.46	0.04	0	4.50	10.07
Coastal Brackish Marsh	3.36	0	0	0	0	3.36
Developed (Ruderal)	2.89	0	0.87	0	0.87	2.02

Developed (Hardscape)	0.71	0	0.20	0	0.20	0.51
Total	173.17	126.67	1.20	0	127.87	45.30

¹ The total impact from the Project footprint is approximately 127.87 acres. Wetland creation is proposed in the conservation easement immediately south of the footprint. The wetland creation may result in additional impact to non-wetland habitat.

This memorandum is organized in sections corresponding to sections of the CEQA Checklist for Biological Resources (CEQA Guidelines Appendix G):

- I. Special-status Plant Species
- II. Special-status Wildlife Species
- III. Riparian Habitat and Other Sensitive Natural Communities
- IV. Protected Wetlands and Waters
- V. Wildlife Movement, Corridors, and Nursery Sites
- VI. Local Policies and Ordinances Protecting Biological Resources
- VII. Adopted HCP, NCCP, or Other Conservation Plans

I. Special-status Plant Species

a. Proposed Impact

The proposed project may have a substantial adverse impact on special-status plant species.

The BRE identified 41 species of special-status plants with the potential to occur in the project Biological Study Area (BSA) based on database searches, general biological surveys, wetland delineation fieldwork, and protocol botanical surveys conducted in 2021 and 2022 (SWCA 2021b; SWCA 2022). A CNDDDB record of bearded popcorn flower (*Plagiobothrys hystriculus*) overlaps the BSA. The record is based on an herbarium specimen collected over 5 miles southeast of the BSA. No other CNDDDB records of special-status plants occur in the BSA. Nearest known records are discussed in the BRE (SWCA 2021b).

The following special-status plants were observed in the BSA during the botanical surveys: 1) a total of 47 Contra Costa goldfield plants located in one seasonal wetland near the western edge of the site, 2) approximately 6,196,679 pappose tarplant individuals located mostly in the central, eastern, and southern portions of the BSA and 3) approximately 905 saline clover individuals in the southern portion of the BSA.

The proposed project will impact a total of 47 Contra Costa goldfield plants occupying 0.03 acre. The proposed project will impact approximately 4,280,464 pappose tarplant plants occupying approximately 29.92 acres. The proposed project will avoid saline clover, the nearest population of which occurs approximately 150 feet to the south. Proposed project impacts to Contra Costa goldfields and pappose tarplant would be potentially significant without mitigation.

Federal endangered and California Rare Plant Rank (CRPR) 1B.1 Contra Costa goldfields were documented in low abundance within the BSA during previous surveys conducted by LSA in 2006 – 2008 (LSA 2010). The location of the occurrences is shown in Figure 4-5 of the Draft Solano HCP (Contra Costa Goldfield Population Areas). This species was verified as evident and identifiable at nearby reference populations in April 2021 and in March and April in 2022 (SWCA 2021b; SWCA 2022) and at the Goldfields Conservation Bank site located in Fairfield between Walters Road and Airbase Parkway on April 23, 2021 (HBG 2021). No Contra Costa goldfields were observed in the BSA during the 2021 protocol survey. During the 2022 protocol survey, 47 Contra Costa goldfields plants were documented in Seasonal Wetland (SW) 51 in the western portion of the site (SWCA 2022).

The entire 127.87-acre proposed project occurs in federal designated critical habitat for Contra Costa goldfields. The condition of the critical habitat affected by the proposed project is poor. The area has been degraded by cultivation, altered hydrology from ditches and road berms, invasion by nonnative grasses, and the presence of Fremont's goldfields (*Lasthenia fremontii*), which are known to hybridize with Contra Costa goldfields (SWCA 2021, 2022). The proposed project will require a Section 404 Clean Water Act permit from the U.S. Army Corps of Engineers (USACE). The USACE will consult with U.S. Fish and Wildlife Service (USFWS) during the 404 CWA permitting regarding Contra Costa goldfields, its critical habitat, and other federal listed species and critical habitat for other species. Proposed project impacts to approximately 127.87 acres of Contra Costa goldfields critical habitat would be potentially significant without mitigation.

Figure Bio-1 is a map showing impacts to natural communities. Figure Bio-2 is a map showing impacts to rare plants documented during the 2021 and 2022 protocol botanical surveys.

b. Proposed Mitigation

The Project proposes the following mitigation measure to minimize potential adverse impacts to special-status plants:

BIO-1a: *Prior to issuance of a grading permit for activities within valley floor grassland or seasonal wetland communities, the project applicant shall retain a qualified botanist/biologist to prepare a Pappose Tarplant Mitigation and Monitoring Plan (PTMMP). At minimum, the mitigation plan shall include seedbank-harvesting procedures, locations where the seedbank will be placed in suitable habitat adjacent to the project site, success criteria, and monitoring activities. The plan shall set forth a minimum 1:1 re-establishment rate, equivalent to 4,280,464 pappose tarplant plants or 29.92 acres occupied with at least 25% absolute cover of pappose tarplant. Monitoring activities shall include five years of annual monitoring of the establishment areas by a qualified botanist/biologist. A letter report documenting annual monitoring results shall be prepared by a qualified botanist/biologist and submitted to the City and CDFW by December of each monitoring year. Seedbank salvage activities shall be completed prior to grading activities. The City of Suisun City shall review and approve the PTMMP prior to issuing the grading permit. The City shall verify the successful completion of the activities outlined in the PTMMP. If mitigation adjacent to the Project site is not feasible, the Project may elect to purchase credits for 29.92 acres of conservation land occupied by*

pappose tarplant. Such credits may be for wetlands or upland habitat so long as it is occupied by pappose tarplant. In the event the Solano HCP is adopted after the project is approved, the project applicant shall have the discretion to implement this mitigation measure, or the mitigation set forth in the HCP. (Pappose tarplant is a Special Management Species in the Draft Solano HCP.)

BIO-1b: *Prior to issuance of a grading permit for activities within valley floor grassland or seasonal wetland communities, the project applicant shall provide the results of a follow-up botanical survey by a qualified botanist documenting the current (within the last 2 years) distribution and abundance of Contra Costa goldfields in the project footprint. The survey shall be conducted according to current U.S. Fish & Wildlife Service and California Department of Fish & Wildlife protocols.*

The applicant shall fully avoid Contra Costa goldfield plants and occupied Contra Costa goldfield habitat (see definition below). Full avoidance shall include a setback of at least 50 feet from all permanent and temporary project impacts. If full avoidance is not feasible, the applicant shall obtain federal Endangered Species Act (ESA) incidental take coverage through a consultation process with USFWS. The applicant shall prepare and submit a Contra Costa Goldfields Mitigation and Monitoring Plan (CCGMMP) to the City and USFWS. The implementation of the CCGMMP would be required as part of the incidental take coverage. At minimum, the CCGMMP shall include seedbank-harvesting procedures, locations where the seedbank will be placed in suitable habitat adjacent to the project site, success criteria, and monitoring activities. The plan shall set forth a minimum 1:1 re-establishment rate (in terms of the number of individual Contra Costa goldfields impacted, or occupied habitat as determined by the most recent botanical survey (as of April 2022, Seasonal Wetland 51 occupying 0.03 acre is the only habitat occupied by Contra Costa goldfields). Monitoring activities shall include five years of annual monitoring of the establishment areas by a qualified botanist/biologist. Annual monitoring reports shall be prepared by a qualified botanist/biologist and submitted to the City and USFWS by December of each monitoring year. Seedbank salvage activities shall be completed prior to grading activities. The City of Suisun City and the USFWS shall review and approve the CCGMMP prior to issuing the grading permit. The applicant shall be responsible for implementing the plan, including funding, monitoring, reporting, and performance of any remedial activities required by the plan. The City shall verify the successful completion of the activities outlined in the CCGMMP.

If mitigation for Contra Costa goldfields is not feasible in areas adjacent to the Project site, the Project may purchase credits for Contra Costa goldfields at a USFWS-approved bank at a minimum ratio of 2:1 for occupied habitat. The term "occupied habitat" is either the extent of the occupied wetland or, if a plant is located in an upland, an area buffered by a 50-foot radius. Proof of purchase of all required Contra Costa goldfields mitigation credits shall be provided to the City prior to issuance of the grading permit.

If during permitting with the USFWS it is determined that additional measures beyond that outlined above are required for impacts to Contra Costa goldfields critical habitat, those measures shall be implemented by the applicant according to the terms of the project's Endangered Species Act incidental take coverage. The applicant shall include those

measures in the CCGMMP, allowing the City the opportunity to review and verify implementation.

In the event the Solano HCP is adopted after the project is approved, the project applicant shall have the discretion to implement this mitigation measure, or the mitigation set forth in the HCP. (Contra Costa goldfields are a Covered Species in the Draft Solano HCP.)

II. Special-status Wildlife Species

a. Proposed Impact

The proposed project may have a substantial adverse impact on special-status wildlife species

The BRE identified 26 species of special-status wildlife with the potential to occur in the BSA based on database searches, general biological surveys, wetland delineation fieldwork, and habitat characterization conducted in 2020 and 2021 (SWCA 2021b). There are no CNDDDB records of special-status wildlife in the BSA. Nearest known records are discussed in the BRE (SWCA 2021b).

No federal or state listed wildlife species were observed during the biological surveys. Protocol surveys for listed vernal pool branchiopods were not conducted. The following special-status wildlife were observed foraging in or over the BSA during surveys: 1) northern harrier (*Circus cyaneus*; state species of special concern), 2) white-tailed kite (*Elanus leucurus*; state fully protected), and 3) loggerhead shrike (*Lanius ludovicianus*; state species of special concern). Numerous birds of prey species protected under the California Fish and Game Code and/or the Migratory Bird Treaty Act were observed foraging over the BSA. No potential raptor nests were observed in the BSA. No burrows suitable for burrowing owl or badgers were observed in the BSA.

General biological surveys are not protocol surveys and, in most cases, are not sufficient evidence to conclude a species is absent and that no impacts will occur. Without mitigation, the proposed project could result in potentially significant impacts to the following wildlife species: Conservancy fairy shrimp (*Branchinecta conservatio*), vernal pool fairy shrimp (*Branchinecta lynchi*), Ricksecker's water scavenger beetle (*Hydrochara rickseckeri*), vernal pool tadpole shrimp (*Lepidurus packardii*), California tiger salamander, Central California DPS (*Ambystoma californiense*), western pond turtle (*Emys marmorata*), tricolored blackbird (*Agelaius tricolor*), grasshopper sparrow (*Ammodramus savannarum*), short-eared owl (*Asio flammeus*), burrowing owl (*Athene cunicularia*), Swainson's hawk (*Buteo swainsoni*), mountain plover (*Charadrius montanus*), northern harrier, white-tailed kite, loggerhead shrike, Suisun song sparrow (*Melospiza melodia maxillaris*), yellow-headed blackbird (*Xanthocephalus xanthocephalus*), nesting raptors and birds of prey, and American badger (*Taxidea taxus*).

The following species have some degree of habitat present in the BSA, but the Project would not result in potentially significant impacts either because the habitat is not present in the footprint, or because the Project would not affect the resource of concern (e.g., butterfly

wintering sites, bird nesting sites): monarch butterfly (*Danaus plexippus plexippus*), delta green ground beetle (*Elaphrus viridis*), golden eagle (*Aquila chrysaetos*), yellow rail (*Coturnicops noveboracensis*), California-black rail (*Laterallus jamaicensis coturniculus*), salt marsh harvest mouse (*Reithrodontomys raviventris*), and Suisun shrew (*Sorex ornatus sinuosus*).

Impacts to Aquatic Invertebrates

Proposed project impacts to approximately 4.50 acres of seasonal wetland may result in potentially significant impacts to Conservancy fairy shrimp, vernal pool fairy shrimp, Ricksecker's water scavenger beetle, and vernal pool tadpole shrimp. The BRE includes an analysis of seasonal wetland hydrology (see BRE Table 5, Aquatic Feature Summary and Characterization). Most of the affected seasonal wetlands are heavily disturbed by disking and dryland farming and do not inundate for sufficient duration to provide breeding habitat for these species. Some of the affected wetlands provide potential breeding habitat, as detailed in the BRE. These aquatic invertebrate species are potentially present in at least some of the 4.50 acres of seasonal wetlands that would be affected (SWCA 2021b). The project would reduce the amount of potentially suitable habitat and could result in 'take' of the federal listed Conservancy fairy shrimp, vernal pool fairy shrimp, and vernal pool tadpole shrimp should these species be present. The proposed project occurs in federal designated critical habitat for Conservancy fairy shrimp (approximately the southeast third of the project), vernal pool fairy shrimp (the entire project), and vernal pool tadpole shrimp (the entire project), the adverse modification of which may require authorization from the U.S. Fish and Wildlife Service. Since the project has the potential to take these species and affect potential habitat, impacts to Conservancy fairy shrimp, vernal pool fairy shrimp, Ricksecker's water scavenger beetle, and vernal pool tadpole shrimp could be significant without mitigation.

Impacts to California Tiger Salamander

Proposed project impacts to approximately 121.10 acres of valley floor grassland, 4.50 acres of seasonal wetland, and 1.20 acres of drainage ditch may result in potentially significant impacts to California tiger salamander (CTS). While no CTS breeding habitat occurs in the area that would be affected, potential CTS breeding habitat does occur within dispersal distance (1.24 miles). The affected habitats may serve as foraging or dispersal habitat for the salamander, which spends most of its adult life in underground burrows. Habitat in the BSA is marginal due to ongoing disking and dryland farming and potential salinity tolerance limits (especially in the southern portion of the BSA). CTS are potentially present within the BSA, but the likelihood of occurrence is low (SWCA 2021b). The project would reduce the amount of potentially suitable foraging and dispersal habitat for CTS by a total of approximately 126.8 acres and could result in 'take' under federal and state endangered species act should any CTS be present in the affected areas. Since the project has the potential to injure and kill individuals, impacts to CTS could be significant without mitigation.

Impacts to Western Pond Turtle

Project construction affecting the freshwater marsh in Drainage Ditch DD-01 and the surrounding area could injure or kill western pond turtle (WPT). Habitat in the ditch is marginal and of limited extent. No WPT nesting would be expected in the BSA due to a lack of sufficient suitable aquatic habitat, and the hard silty-clayey soils that occur throughout the BSA (SWCA

2021b). WPT could be present in DD-01 and could migrate through the BSA. Since the project has the potential to injure and kill individuals, impacts to WPT could be significant without mitigation.

Impacts to Burrowing Owl

As a bird species that nests and shelters within underground burrows, burrowing owl is especially vulnerable to construction related impacts. Project construction has the potential to injure or kill burrowing owl and could cause nest abandonment if occupied burrows occur in or adjacent to the footprint or work areas. While no owls or potentially suitable burrows were observed during biological surveys, burrows could become established and occupied in the future (SWCA 2021b). The nearest record of burrowing owl is from 1992, approximately 1 mile south of the BSA on the opposite side of a large area of coastal marsh. The next closest records are from 1982 and 1989, over 1.5 miles to the northeast, north of Travis AFB. While the project will reduce the amount of regionally available foraging habitat for burrowing owl, there is ample foraging habitat of equal or greater value available in the areas to the northeast, east, and south, in the vicinity of the known records. Proposed impacts to approximately 126.8 acres of foraging habitat will not result in regional decline of the species. Since the project has the potential to injure and kill individuals and cause nest abandonment, impacts to burrowing owl could be significant without mitigation.

Impacts to Swainson's Hawk

A few young/small riparian trees along the drainage ditches DD-01 and DD-02 may be removed. The trees are not large enough to support the nest of a large raptor. Swainson's hawks could nest in suitable off-site trees located within 0.25 mile and forage in the study area. The closest CNDDDB record (Occurrence #2714) is from 2015, approximately 3.4 miles northeast of the BSA, north of Cement Hill Road. The BRE identifies trees outside the BSA but still in the project vicinity that could serve as suitable nesting habitat for Swainson's hawk. Impacts to approximately 126.8 acres of Swainson's hawk foraging habitat could be significant without mitigation.

Impacts to Nesting and Overwintering Birds

Project construction has the potential to disrupt nesting and overwintering birds including tricolored blackbird, grasshopper sparrow, short-eared owl, Swainson's hawk, mountain plover, northern harrier, white-tailed kite, loggerhead shrike, Suisun song sparrow, yellow-headed blackbird, and other nesting raptors and birds of prey protected under the federal Migratory Bird Treaty Act and/or California Fish and Game Code. While no active nests were observed during the general biological surveys, active nests could become established in the BSA or adjacent areas and project construction could lead to nest destruction or abandonment. Impacts to protected nesting and overwintering birds could be significant without mitigation.

Impacts American Badger

No American badgers or sign were observed during general biological surveys. The seasonally elevated water table, especially in the southern portion of the study area, may limit suitability for denning. There is a limited prey base; No California ground squirrels were observed in the BSA. While the project will reduce the amount of regionally available foraging

habitat, there is ample foraging habitat of equal or greater value available in the areas to the northeast, east, and south, in the vicinity of the known records. Proposed impacts to foraging habitat will not result in regional decline of the species. Project impacts to American badger are less than significant.

b. Proposed Mitigation

The Project proposes the following mitigation measure to minimize potential adverse impacts to special-status wildlife:

BIO-2a: *Prior to the first ground-disturbing activities, the project applicant shall retain a qualified wildlife biologist acceptable to the City Development Services Director or the Director's designee, and USFWS, to conduct focused protocol surveys for Conservancy fairy shrimp, vernal pool fairy shrimp, and vernal pool tadpole shrimp to determine the presence/absence of these species within the disturbance area. The survey will also cover Ricksecker's water scavenger beetle. The protocol surveys shall be conducted according to the guidelines established by latest edition of the Survey Guidelines for the Listed Large Branchiopods. If Conservancy fairy shrimp, vernal pool fairy shrimp, or vernal pool tadpole shrimp are determined to be present on-site, potential impacts to these species will necessitate ESA consultation with USFWS. At a minimum, the following performance standards shall be satisfied regardless of what USFWS requires through such a consultation. Effects on Conservancy fairy shrimp, vernal pool fairy shrimp, vernal pool tadpole shrimp, Ricksecker's water scavenger beetle, and their habitat shall be avoided, if feasible. If avoidance is not feasible, the applicant shall ensure the compensation, at a ratio of no less than 1:1, of offsite habitat of equal or superior quality to that disturbed by the project. Such compensation shall be achieved through the use of conservation easements, mitigation banks, or similar strategies resulting in permanent protection. If acceptable to USFWS and scientifically defensible, the applicant may use preserved lands, or portions thereof, not only for habitat for Conservancy fairy shrimp, vernal pool fairy shrimp, and vernal pool tadpole shrimp, but also for Ricksecker's water scavenger beetle, wetlands preservation, and for habitat for other species for which the City is requiring offsite preservation (e.g., California tiger salamander and burrowing owl). The applicant may choose to assume the presence of listed branchiopods for the purposes of consultation with USFWS. In the event the Solano MSHCP is adopted after the project is approved, the project applicant shall have the discretion to implement this mitigation measure, or the mitigation measures set forth in the MSHCP.*

BIO-2b: *Prior to the first ground-disturbing activities, the project applicant shall retain a qualified wildlife biologist acceptable to the City Development Services Director or the Director's designee to conduct focused protocol surveys for California tiger salamander to determine the presence/absence of this species within the disturbance area. If the applicant encounters seasonal conditions, abnormal weather conditions, property access, time constraints, or any other potential barrier to completion of presence/absence surveys, they can assume presence and proceed with consultation and propose conservation/mitigation measures for the proposed effects to habitat. If the applicant chooses to conduct presence/absence surveys, the protocol surveys shall be conducted according to the guidelines established by USFWS Interim Guidance on Site Assessment and Field Surveys*

for Determining Presence or a Negative Finding of the California Tiger Salamander October 2003 or latest edition. If the California tiger salamander is determined to be present or is assumed to be present on the project site, the applicant will need to acquire ESA/CESA take permits. At a minimum, the following performance standards shall be satisfied, regardless of what USFWS requires through such a consultation. Effects on California Tiger Salamander and its habitat shall be avoided, if feasible. If avoidance is not feasible, the applicant shall relocate the species to a suitable location in accordance with resource agency protocols and permit requirements, and shall ensure the preservation, at a ratio of no less than 1:1, of offsite habitat of equal or superior quality to that disturbed by the project. Such preservation shall be achieved through the use of conservation easements, mitigation banks, or similar strategies resulting in permanent preservation. If acceptable to USFWS and CDFW, the applicant may use preserved lands, or portions thereof, not only for habitat for California tiger salamander, but also for wetlands preservation and for habitat for other species for which the City is requiring offsite preservation (e.g., vernal pool fairy shrimp, vernal pool tadpole shrimp, and burrowing owl). In the event the Solano MSHCP is adopted after the project is approved, the project applicant shall have the discretion to implement this mitigation measure, or the mitigation measures set forth in the MSHCP.

BIO-2c: *No more than 30 days prior to the first ground-disturbing activities, the project applicant shall retain a qualified wildlife biologist acceptable to the City Development Services Director or the Director's designee to conduct a focused survey for northwestern pond turtle to determine presence or absence of this species within a 100-foot radius of the disturbance area. If construction occurs between April 1 and September 30, this survey shall include turtle nests. If a nest is found within a 100-foot radius of the project site, construction shall not take place within 100 feet of the nest until the turtles have hatched or the eggs have been moved to an appropriate location under consultation with a qualified biologist. Construction shall be avoided when adults and hatchlings are overwintering (October 1 to February 28/29), because of the likelihood that turtle adults and juveniles could be present in upland habitats. If construction activities must occur during this time frame, a survey for overwintering locations shall be conducted no more than 14 days prior to construction. If this species is found overwintering within the project site, den locations shall be avoided until the area is unoccupied, as determined by a qualified biologist.*

A worker awareness program shall be established and implemented prior to construction. The program shall include, at a minimum, species identification, a description of suitable habitat for this species, and measures to implement in the event that this species is found during construction. The program shall be presented to all members of the construction crew.

A qualified wildlife biologist will be present during initial clearing and grubbing in DD-01 to further minimize potential impacts to turtles. In the event that a turtle is found during project implementation, construction activities shall stop until the turtle is moved by a qualified biologist to a safe location outside the construction zone.

In the event a nest is located, the area shall be fenced and signs shall be posted to alert the construction crew as to the sensitivity of the habitat in question.

In the event the Solano MSHCP is adopted after the project is approved, the project applicant shall have the discretion to implement this mitigation measure, or the mitigation set forth in the MSHCP.

BIO-2d: *No more than 30 days prior to the first ground-disturbing activities, the project applicant shall retain a qualified wildlife biologist acceptable to the City Development Services Director or the Director's designee to conduct a burrowing owl habitat assessment in accordance with latest CDFW guidelines to determine if there are active burrow locations within the disturbance area. Surveys for occupied burrows shall be completed within all construction areas and within 300 feet from the disturbance area (where possible and appropriate based on habitat). If no burrowing owls are detected during the pre-construction survey, no further action is necessary. If construction is delayed or suspended for more than 30 days after the survey, the area shall be resurveyed in accordance with previously described methods. If burrowing owls are found through the pre-construction surveys, all occupied burrows shall be mapped on an aerial photo. At least 15 days prior to the expected start of any project-related ground disturbance activities, or restart of activities, a copy of the burrowing owl survey report and mapping shall be provided to CDFW. If nesting behavior is observed within the known nesting season (February 1 to August 31), a buffer will be established around the burrow (between 50 meters and 500 meters depending on time of year and disturbance level, as described in the 2012 CDFW staff report) until the young have fledged, or an unsuccessful nesting attempt is documented. If occupied burrows (non-nesting season, or non-breeding occupation) are found and direct impacts to the burrows are unavoidable, the first step shall be the exclusion and passive relocation of the owls as described in the 2012 staff report, including preparation and approval of a burrowing owl exclusion and passive relocation plan. The second step shall be the preservation, at a ratio of no less than 1:1, of offsite habitat of equal or superior quality to that disturbed by the project. Such preservation shall be achieved through the use of conservation easements, mitigation banks, or similar strategies resulting in permanent preservation. If scientifically defensible and acceptable to any resources agencies whose permission is necessary, the applicant may use preserved lands, or portions thereof, not only for habitat for burrowing owl, but also for wetlands preservation and for habitat for other species for which the City is requiring offsite preservation (e.g., vernal pool fairy shrimp, vernal pool tadpole shrimp, and California tiger salamander). In the event the Solano MSHCP is adopted after the project is approved, the project applicant shall have the discretion to implement this mitigation measure, or the mitigation set forth in the MSHCP.*

BIO-2e: *Between March 1 and August 31, a qualified wildlife biologist acceptable to the City Development Services Director or the Director's designee shall conduct pre-construction surveys to identify and subsequently avoid nesting Swainson's hawk. A qualified biologist shall conduct pre-construction surveys based on the Swainson's hawk Technical Advisory Committee's Recommended Timing and Methodology for Swainson's hawk Nesting Surveys (May 2000) to determine the presence or absence of nesting Swainson's hawk. Surveys require at least 7 days of surveying, depending on the project schedule (1 visit January-March 20, 3 visits March 20-April 5, and 3 visits April 5 to April 20.) The survey will be of sufficient intensity to document nesting within 0.25 mi (1,320 ft) of planned work*

activities. If a lapse in project-related construction work of 15 days or longer occurs, additional pre-construction surveys shall be required before project work may be reinitiated. If a nest is occupied after April 20, a buffer will be created to protect the nesting hawks through the post-fledging period (July 30).

Construction work (including grading, earthmoving, and any operation of construction equipment) shall not occur within a 0.25 mi buffer zone around an active Swainson's hawk nest except as provided below. Construction work may commence in the buffer zone when a qualified wildlife biologist acceptable to the City Development Services Director or the Director's designee has confirmed that nesting activity is complete (e.g., Swainson's hawk young have fully fledged and are capable of flight and have left the nest, or the adults have abandoned the nest for a minimum of 7 days and there is no evidence of re-nesting activity). Nest trees may be removed between September 16 and February 1 when nests are unoccupied.

The size of nest site buffer zones may be reduced only under the following conditions:

1. A site-specific analysis prepared by the qualified biologist indicates that the nesting pair under consideration are not likely to be adversely affected by construction activities¹ (e.g., the nest is located in an area where the hawks are habituated to human activity and noise levels comparable to anticipated construction work). Either CDFW, or the HCP Technical Review Committee (if the HCP is adopted), must approve this analysis before construction may begin within 0.25 mi of a nest.

2. Monitoring by a qualified biologist is conducted for a sufficient time (during all construction activities for a minimum of 10 consecutive days following the initiation of construction), and the nesting pair does not exhibit adverse reactions to construction activities (e.g., changes in behavioral patterns, reactions to construction noise).

3. Monitoring is continued at least once a week through the nesting cycle at that nest. This longer-term monitoring may be reduced to a minimum of 2 hours in the morning and 2 hours in the afternoon during construction activities; however, additional and more frequent monitoring may be required if any adverse reactions are noted.

If a nest tree becomes occupied by Swainson's hawk during ongoing construction activities, construction activities shall not occur within 500 ft of the nest, except where monitoring consistent with the criteria in MM BIO 2g documents that adverse effects will not occur.

Long-term impacts to Swainson's hawk foraging habitat in the Valley Floor Grassland Conservation Area shall be mitigated through the preservation and management of foraging habitat at a ratio of 1:1 (mitigation-to-impact). All valley floor grassland mitigation associated with other species will count toward Swainson's hawk foraging habitat.

BIO-2f: *Prior to the first ground-disturbing activities that occur between February 1 and August 31 (i.e., the nesting season), the project applicant shall retain a qualified wildlife biologist acceptable to the City Development Services Director or the Director's designee to*

conduct a nesting bird survey to determine if nests of all applicable migratory species are active or occupied within the project site. Any active nests observed on the project site shall be avoided until after the nestlings have fledged and left the nest. If avoidance of all activities near an active nest is not feasible during the nesting season, then a qualified biologist shall be present and work with the applicant to establish appropriate temporary buffer areas for the nest(s). Depending on species and level of activity, construction activity within up to 250 feet of the active nests may only be conducted at the discretion of the biological monitor. Ground disturbing activities that occur between September 1 and January 31 (i.e., the non-breeding season) are not subject to the provisions of this mitigation measure. In the event the Solano MSHCP is adopted after the project is approved, the project applicant shall have the discretion to implement this mitigation measure, or the mitigation set forth in the MSHCP.

With the inclusion of MMs Bio 2a-2f, impacts to the following wildlife species would be less than significant: Conservancy fairy shrimp (*Branchinecta conservatio*), vernal pool fairy shrimp (*Branchinecta lynchi*), Ricksecker's water scavenger beetle (*Hydrochara rickseckeri*), vernal pool tadpole shrimp (*Lepidurus packardii*), California tiger salamander, Central California DPS (*Ambystoma californiense*), western pond turtle (*Emys marmorata*), tricolored blackbird (*Agelaius tricolor*), grasshopper sparrow (*Ammodramus savannarum*), short-eared owl (*Asio flammeus*), burrowing owl (*Athene cunicularia*), Swainson's hawk (*Buteo swainsoni*), mountain plover (*Charadrius montanus*), northern harrier, white-tailed kite, loggerhead shrike, Suisun song sparrow (*Melospiza melodia maxillaris*), yellow-headed blackbird (*Xanthocephalus xanthocephalus*), nesting raptors and birds of prey, and American badger (*Taxidea taxus*).

III. Riparian Habitat and Other Sensitive Natural Communities

a. Proposed Impact

The proposed project may have adverse impacts to sensitive natural communities or riparian habitat.

The BRE (SWCA 2021b) and Table BIO-1 above identify the following sensitive natural communities in the BSA: drainage ditches (as seasonal wetland/freshwater marsh), coastal brackish marsh, seasonal wetlands, and freshwater marsh), and alkali meadow. Sensitive vegetation alliances of conservation concern (*Centromadia parryi* Herbaceous Alliance; *Cressa truxillensis* – *Distichlis spicata* Herbaceous Alliance; and *Frankenia salina* Herbaceous Alliance) occur within those communities. The coastal brackish marsh and alkali meadow will be avoided and preserved. The *Cressa truxillensis* - *Distichlis spicata* and *Frankenia salina* alliances occur only in the southernmost seasonal wetlands (located in or south of the alkali meadow) and will be avoided in the preserve. The *Centromadia parryi* Herbaceous Alliance is found within the seasonal wetlands and valley floor grassland communities in the project area. Based on the results of the 2021 botanical surveys it is estimated that between four and five million plants in this vegetation alliance will be impacted within the project footprint. A few riparian trees along the large north-south aligned drainage ditches (220 square feet) will also be removed during project construction.

b. Proposed Mitigation

The Project proposes the following mitigation measures to minimize potential adverse impacts to sensitive natural communities:

- BIO-1a: Pappose tarplant (*Centromadia parryi*) mitigation.
- BIO-1b: Contra Costa goldfields mitigation.
- BIO-3 provides mitigation for aquatic resource impacts (drainage ditches (including woody riparian), seasonal wetlands, and freshwater marsh).

IV. Protected Wetlands and Waters

a. Proposed Impact

The proposed project may have a substantial adverse impact on federally or state protected wetlands and waters.

An aquatic resources delineation of the project area was conducted in 2020 and 2021. The Aquatic Resources Delineation Report was submitted to the San Francisco District of the U.S. Army Corps of Engineers (USACE) for verification. A field verification with the USACE was held on October 28th, 2021, and the delineation map then updated to reflect field-verified wetland boundaries. The USACE verified the aquatic resource boundaries in a Preliminary Jurisdictional Determination letter dated January 31, 2022. Acreages and boundaries analyzed in this document (and in the BRE) reflect the field-verified boundaries.

The proposed project would fill a total of approximately 1.20 acres of drainage ditch (including 0.54 acres of seasonal wetland in Drainage Ditch DD-02), approximately 4.50 acres of seasonal wetland (not including the 0.54 acre of seasonal wetland in Drainage Ditch DD-02). The proposed impacts are summarized in Table Bio-1 and shown on Figure Bio-1.

Mitigation Measure BIO-3 requires the applicant to obtain all requisite authorization from agencies with jurisdiction over resources within the project site, and to meet a minimum performance standard (requiring one acre of restoration (or other mitigation method listed in BIO-3) for each acre impacted by development). Such approvals from other agencies may include Section 404 permit(s), Section 1602 Lake and Stream Alteration Agreement(s), and Section 401 Water Quality Certification(s). BIO-3 ensures that there would be no net loss of aquatic habitats, and jurisdictional waters and reduce impacts to less than significant.

b. Proposed Mitigation

The Project proposes the following mitigation measure to minimize potential adverse impacts to federally or state protected wetlands and waters:

BIO-3: *Prior to issuance of grading permits for activities that impact protected aquatic resources, the project applicant shall obtain all requisite authorizations from agencies with jurisdiction over the affected aquatic resources. Such agencies will include, but may not be limited to, the United States Army Corps of Engineers, the California Department of Fish and Wildlife, and the San Francisco Bay Regional Water Quality Control Board. Regardless of agency permit requirements, impacted resources shall be offset through onsite restoration, offsite restoration, purchase of credits at an agency-approved mitigation bank in the region,*

or another agency-approved habitat mitigation method (e.g., re-establishment, preservation, etc.) at no less than a 1:1 ratio. This ratio applies to wetlands and waters subject to federal and/or state jurisdiction. Such mitigation may simultaneously satisfy other project mitigation requirements for sensitive species or critical habitat (e.g. vernal pool fairy shrimp, vernal pool tadpole shrimp, California tiger salamander, Swainson's hawk, and burrowing owl) if the applicant demonstrates to the City and applicable resource agencies that the mitigation lands provide suitable habitat and meet all other mitigation specifications.

V. Wildlife Movement, Corridors, and Nursery Sites

a. Proposed Impact

The proposed project would not have substantial impacts to fish or wildlife movement, corridors, or nursery sites.

While not approved, the draft HCP recognizes a key wildlife corridor linking Jepson-Prairie and the Suisun Marsh (Corridor #6 on HCP Figure 4-2, Key Corridors within the Plan Area) on the south side of Highway 12. The areas affected by the project are not in the corridor and the project would not affect connectivity between Jepson Prairie and the Suisun Marsh. The Terrestrial Connectivity, Areas of Conservation Emphasis (ACE; CDFW Bios Layer 2021) dataset identifies the area that would be affected by the project as Connectivity Rank 3 (Connections with Implementation Flexibility). The affected habitat is not considered an irreplaceable and essential corridor, nor a conservation planning linkage.

South of the Project, SR-12 separates the project site from Suisun Marsh and is a barrier to wildlife movement and affects hydrology to and from the project site. Wildlife movement across SR-12 is constrained due to the continuous median concrete barrier rail that separates the two lanes of traffic. The two drainages are connected through relatively small, hard bottomed culverts that are normally not passable. The soft-bottomed Union Creek crossing approximately a quarter mile to the east is a more likely crossing location for smaller animals. The high traffic volume on the highway, combined with higher quality habitat to the south and east, there are no known or mapped wildlife corridors to and from the project site. Given the existing barriers and the preservation of open space on the project site, the proposed project would not have significant adverse effects on wildlife movement. There are no fish or wildlife nursery sites known or likely to occur within the proposed impact area. Impacts would be less than significant.

The BSA is located in the Pacific Flyway. The Suisun Marsh, including the marsh area in the southern portion of the BSA, is important habitat that provides a critical stopover for migratory birds. The marsh in the southern portion of the BSA is a small part of the 116,000-acre Suisun Marsh. The proposed project area has disturbed seasonal wetland and agricultural field/grassland habitats that provide limited stopover habitat for migratory birds. Waterfowl and shorebirds were not observed in the seasonal wetlands or agricultural field/grassland in the proposed project area during baseline surveys (waterfowl and shorebirds were observed primarily in association with the coastal brackish marsh adjacent to SR 12, about 1000 feet south of the proposed project). The BSA is physically separated from the Suisun Marsh by SR 12. The proposed project is expected to have negligible impacts on the Pacific Flyway and regional bird movements.

Bird strikes with waterfowl are a concern at Travis AFB and are known as Bird Aircraft Strike Hazards (BASH). This is due to the location of Travis AFB within the Pacific Flyway. The area around Travis AFB is also a wintering area for a large population of ducks and abundant populations of geese and swans. The various large marsh complexes south and west of the BSA account for most of the waterfowl movement in the region. The local landfills and hunting clubs also attract neotropical migrants and waterfowl, further complicating the issue. A wildlife hazard assessment memorandum prepared in March 2021 by AECOM biologists concluded that,

...the construction and development associated with the Suisun Logistics Center would not increase the activity or presence of birds or other wildlife. Therefore, the project would not present a hazard to TAFB flight operations. We expect overall wildlife activity on the property to remain at or below current levels, based on our understanding of the planned development and assessment of existing habitat.

In comparison to the existing habitat and regional attractants for various bird species within the Pacific Flyway, no noticeable difference in the local bird population or its movements will occur because of the proposed project and is not expected to change the BASH risk at Travis AFB.

b. Proposed Mitigation

No mitigation is necessary specific to this potential impact. Mitigation Measures BIO-1a, 1b, 2h, and 3 will provide habitat mitigation for potential loss of rare plants, Swainson's hawk foraging habitat, and wetlands and waters that will compensate for the loss of the migratory bird habitats impacted in the project area.

VI. Local Policies and Ordinances Protecting Biological Resources

a. Proposed Impact

The proposed project may conflict with applicable provisions of Local Policies and Ordinances Protecting Biological Resources.

The City of Suisun City 2035 General Plan, adopted May 5, 2015, sets forth the following goals, objectives, and policies relevant to biological resources:

- **Goal OSC-1:** Protect wildlife habitat and movement corridors through the preservation of open space.
- **Objective OSC-1:** Increase the number of new developments that preserve and integrate drainages and other wildlife movement into site plans.
- **Policy OSC-1.1:** The City will require biological resources investigations for proposed developments that could adversely affect potential wildlife movement corridors to determine the value and importance of such corridors to daily and/or seasonal movement and dispersal of local wildlife and identify measures to minimize and avoid adverse effects on wildlife movement. Wildlife movement corridors include marshlands, waterways, and other types of corridors that provide for movement and dispersal.

- **Policy OSC-1.2:** New developments in areas with waterways, riparian habitats, and stands of mature trees shall preserve and incorporate those features into project site planning and design, to the greatest extent feasible.
- **Policy OSC-1.3:** New developments shall be designed to protect and preserve natural watercourses and drainage channels to the maximum extent feasible.
- **Policy OSC-1.4:** New development shall preserve and incorporate into site planning natural drainages that could support riparian habitat.
- **Policy OSC-1.8:** Roads, water lines, sewer lines, drainage facilities, and other public facilities constructed to serve development shall be located and designed to avoid substantial impacts to stream courses, associated riparian areas, and wetlands, to the greatest practical extent.
- **Goal OSC-2:** Ensure consistency with Solano Multispecies Habitat Conservation Plan.
- **Objective OSC-2:** New development in the Planning Area supports the conservation objectives of the Solano Multispecies HCP.
- **Policy OSC-2.1:** The City will coordinate environmental review and mitigation requirements with the Solano Multispecies HCP.
- **Policy OSC-2.3:** The City will require that new developments comply with relevant conservation measures detailed within the Conservation Strategy chapter of the Solano Multi- Species HCP, as applicable.

b. Proposed Mitigation

The Project is not inconsistent with an adopted HCP. Regardless, the project proposes Mitigation Measure BIO-5 (described in the section that follows) to allow flexibility with future changes to local policies and ordinances.

VII. Adopted HCP, NCCP, or Other Conservation Plans

a. Proposed Impact

The proposed project may conflict with applicable provisions of the unadopted Solano Habitat Conservation Plan.

The Solano HCP is currently in final administrative draft format (Drafted in October 2012) and has not been adopted by the County and approved by the resource agencies. Thus, at the time of this writing, it is legally non-binding. CEQA normally does not require an analysis of consistency with such a draft, unadopted plan. (See *Chaparral Greens v. City of Chula Vista* (1996) 50 Cal.App.4th 1134, 1145.) Even so, this document addresses the proposed project's consistency with the currently *proposed* Solano HCP because General Plan Goal OSC-2 is to "[e]nsure consistency with Solano Multispecies Habitat Conservation Plan." This Goal, in turn, gave rise to specific policies (OSC-2.1, OSC-2.2, and OSC-2.3) that require compliance with the HCP once it is adopted.

Should the proposed plan be adopted, the HCP will promote the conservation of biologically significant areas while simultaneously allowing urban development and the continuation of ongoing land use activities, such as agriculture. The Solano HCP will be a 50-year plan designed to create a reserve of connected natural habitats throughout the County. In exchange for protecting the reserve area, the Solano HCP would allow for the "take" of

threatened, endangered, rare, and covered plant and animal species and habitats as part of “covered activities” in non-reserve areas.

The project site is located within the HCP-designated *High Value Conservation Area Subarea 1F: Potrero Hills/Lower Union Creek/Denverton Creek Contra Costa Goldfields Core Population: High Value Conservation Criteria 1, 2, 3, 4, 5, 6, and 7 (4,990 ac)*. The project site is located in Covered Activity Zone 1 of the proposed HCP, with impacts to covered species and habitats to be fully mitigated at off-site preserve areas by providing fee payments to preserve habitat elsewhere in the plan boundaries.

Mitigation Measure BIO-5 requires that, in the event the Solano HCP is adopted prior to the beginning of construction, the applicant may choose to participate in the HCP. Participation would require payment of mitigation fees to the City of Suisun City in accordance with the provisions of the plan. Participation would require the project to implement the mitigation measures outlined in the HCP. Mitigation Measures BIO-1, and BIO-2a to BIO-2e will also serve to reduce impacts to habitat and both covered and non-covered species under the HCP. With the implementation of HCP mitigation, impacts would be reduced to a level of less than significant.

b. Proposed Mitigation

It is not an inconsistency with the HCP should the applicant decline to obtain coverage under the HCP if the HCP is adopted after the project EIR. The Project proposes the following mitigation measures to minimize potential conflicts with the Solano HCP:

BIO-5: The applicant may voluntarily seek coverage under the Solano Habitat Conservation Plan (HCP) if the HCP is adopted by the County and participating local jurisdictions, approved by the resource agencies, and the fee program has been established prior to the issuance of the grading permit. If the applicant seeks coverage, the applicant would be required to pay mitigation fees and/or dedicate land to the City of Suisun City in accordance with the provisions of the HCP, and the applicant would be required to comply with the applicable provisions of the HCP that pertain to plant and wildlife surveys and mitigation requirements. If the project has permit conditions that require the purchase of mitigation and/or conservation credits from a USFWS approved mitigation bank, the resource agencies may allow the applicant to provide fee payments to preserve habitat elsewhere in the plan boundaries.

LITERATURE CITED

Huffman-Broadway Group, Inc. (HBG). December 2021. 2021 Plant Survey for Highway 12 Logistics Center Project Solano County, California. Prepared for Buzz Oates Construction and Tom Gentry California Company. Huffman-Broadway Group, Inc., San Rafael, CA.

Solano County Water Agency (SCWA). October 2012. Solano Habitat Conservation Plan Volume I, Public Draft.

Swainson's Hawk Technical Advisory Committee, May 31, 2000. *Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys In California's Central Valley.*

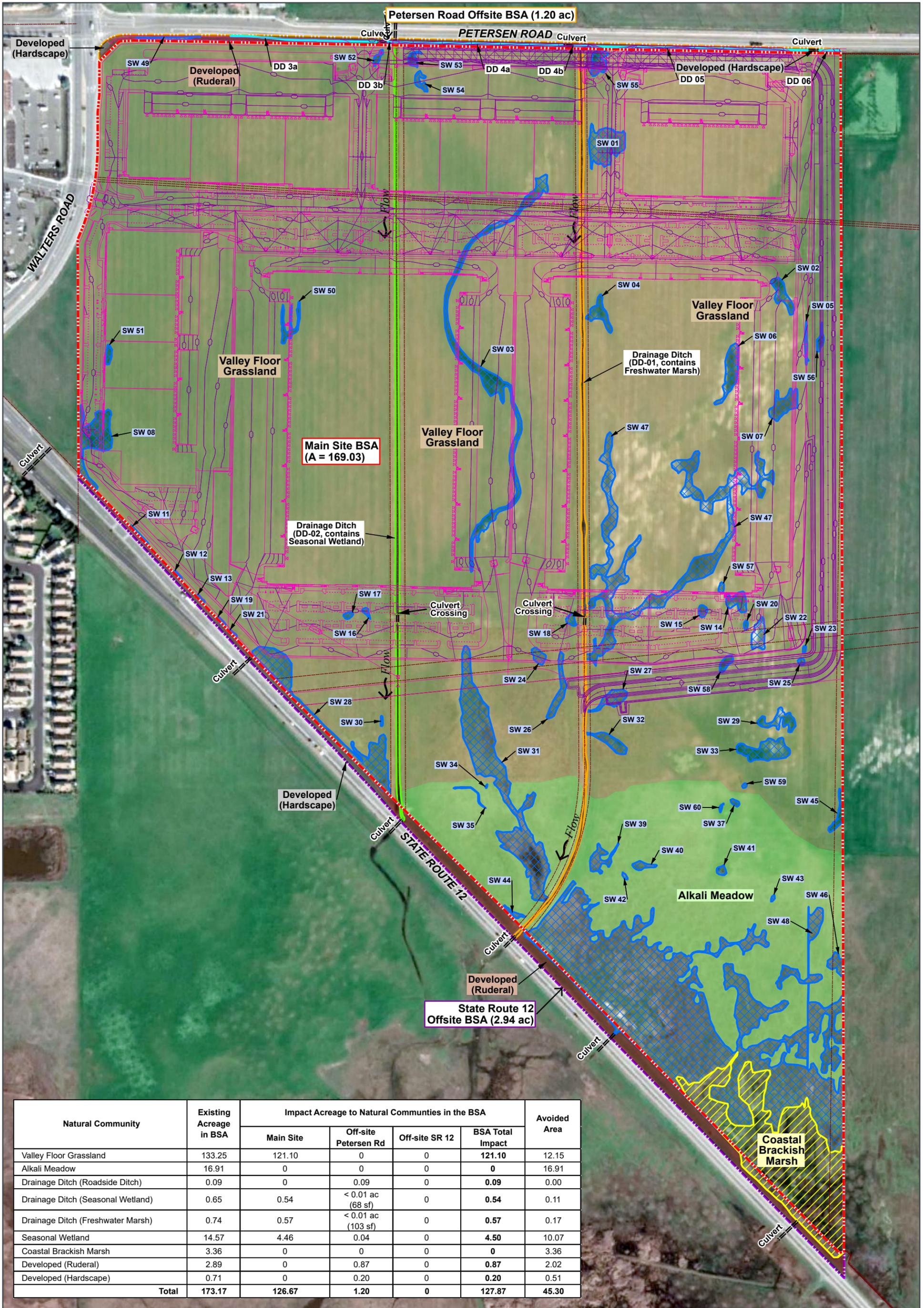
SWCA Environmental Consultants (SWCA). April 2022. Technical Memorandum: 2022 Spring Botanical Survey Results for the Suisun Logistics Center Project, Solano County, California. Prepared for Buzz Oates Enterprises. SWCA Environmental Consultants, Sacramento, CA.

SWCA Environmental Consultants (SWCA). September 2021 (2021a). Aquatic resources delineation report for the Suisun Logistics Project. Prepared for Buzz Oates Enterprises. SWCA Environmental Consultants, Sacramento, CA.

SWCA Environmental Consultants (SWCA). October 2021 (2021b). Biological Resources Evaluation and Botanical Inventory Report for the Suisun Logistics Project. Prepared for Buzz Oates Enterprises. SWCA Environmental Consultants, Sacramento, CA.

FIGURE Bio-1

Impacts to Natural Communities



Natural Community	Existing Acreage in BSA	Impact Acreage to Natural Communities in the BSA				Avoided Area
		Main Site	Off-site Petersen Rd	Off-site SR 12	BSA Total Impact	
Valley Floor Grassland	133.25	121.10	0	0	121.10	12.15
Alkali Meadow	16.91	0	0	0	0	16.91
Drainage Ditch (Roadside Ditch)	0.09	0	0.09	0	0.09	0.00
Drainage Ditch (Seasonal Wetland)	0.65	0.54	< 0.01 ac (68 sf)	0	0.54	0.11
Drainage Ditch (Freshwater Marsh)	0.74	0.57	< 0.01 ac (103 sf)	0	0.57	0.17
Seasonal Wetland	14.57	4.46	0.04	0	4.50	10.07
Coastal Brackish Marsh	3.36	0	0	0	0	3.36
Developed (Ruderal)	2.89	0	0.87	0	0.87	2.02
Developed (Hardscape)	0.71	0	0.20	0	0.20	0.51
Total	173.17	126.67	1.20	0	127.87	45.30

SUISUN LOGISTICS CENTER PROJECT
Impacts to Natural Communities

- Main Site Biological Study Area (BSA; 169.03 ac)
- Petersen Road Offsite BSA (1.20 ac)
- State Route 12 Offsite BSA (2.94 ac)
- Culvert

- Natural Communities**
- Drainage Ditch (Roadside Ditch)
 - Drainage Ditch (Seasonal Wetland)
 - Drainage Ditch (Freshwater Marsh)
 - Seasonal Wetland
 - Coastal Brackish Marsh
 - Valley Floor Grassland
 - Alkali Meadow
 - Developed (Ruderal)
 - Developed (Hardscape)

- Project Features**
- Project Footprint / Permanent Impact
 - Grading and Drainage Improvements
 - Proposed Site Improvements
 - Utility and Drainage Easements

Solano County, CA
 NAD 1983 StatePlane California II FIPS 0402 Feet
 38.2375°N 121.9837°W

Aerial Photograph: 7 February 2020, 20200 Maxar Technologies Imagery Google Earth Pro

Updated: 1/25/2022
 Project No. 66497
 Layout: gabrychProperty_BioresImpact(11x17P)
 Aprx: 66497_gabrychProperty

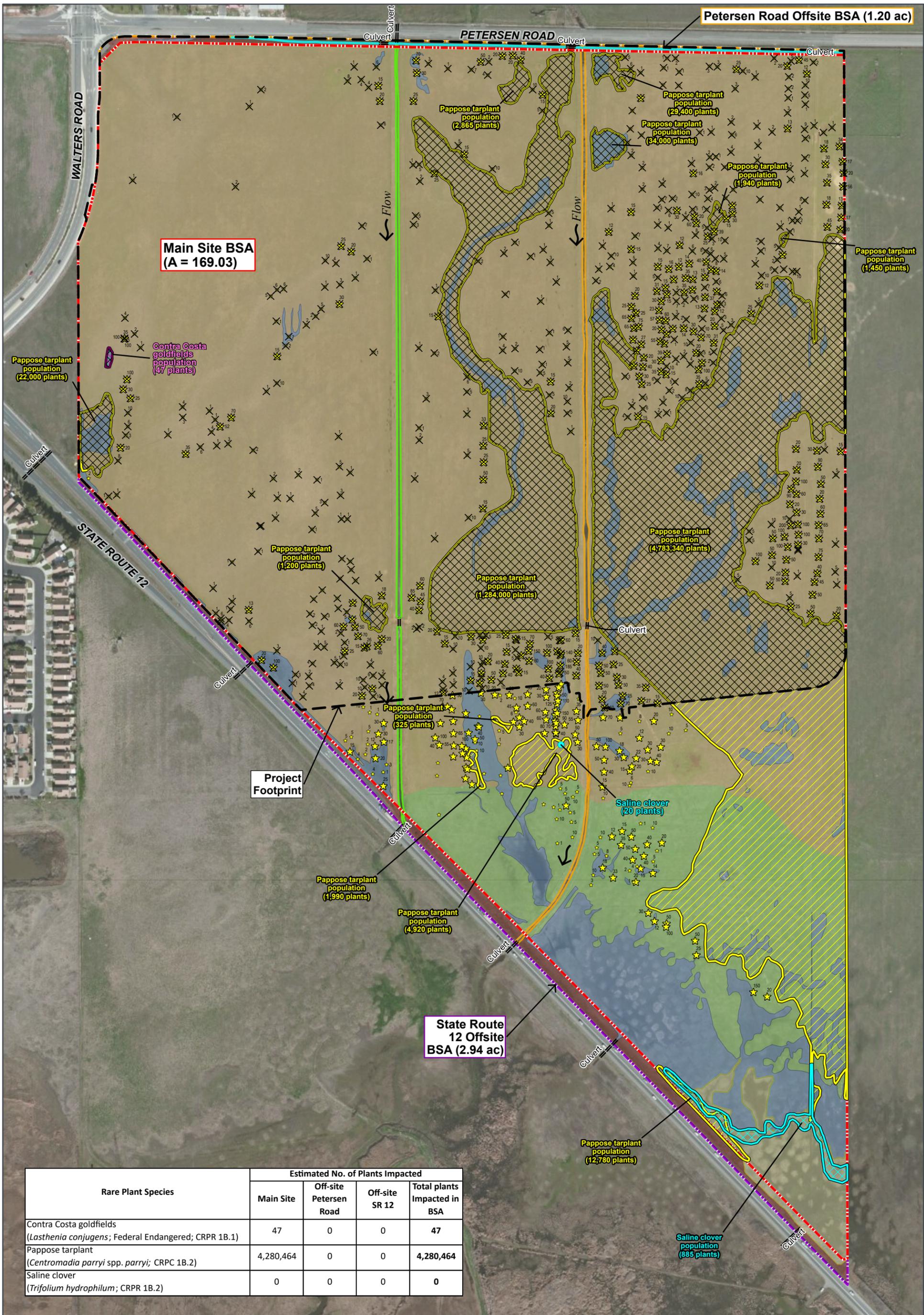
0 140 280 Feet
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FIGURE Bio-2

Impacts to Rare Plants



Rare Plant Species	Estimated No. of Plants Impacted			
	Main Site	Off-site Petersen Road	Off-site SR 12	Total plants Impacted in BSA
Contra Costa goldfields (<i>Lasthenia conjugens</i> ; Federal Endangered; CRPR 1B.1)	47	0	0	47
Pappose tarplant (<i>Centromadia parryi</i> spp. <i>parryi</i> ; CRPC 1B.2)	4,280,464	0	0	4,280,464
Saline clover (<i>Trifolium hydrophilum</i> ; CRPR 1B.2)	0	0	0	0

SUISUN LOGISTICS CENTER PROJECT

Impacts to Rare Plants Observed in 2021 and 2022

Legend

- Main Site Biological Study Area (BSA; 169.03 ac)
- Petersen Road Offsite BSA (1.20 ac)
- State Route 12 Offsite BSA (2.94 ac)
- Culvert
- Project Footprint

Natural Communities

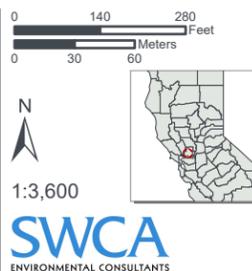
- Drainage Ditch (Roadside Ditch)
- Drainage Ditch (Seasonal Wetland)
- Drainage Ditch (Freshwater Marsh)
- Seasonal Wetland
- Coastal Brackish Marsh
- Valley Floor Grassland
- Alkali Meadow
- Developed (Hardscape)
- Developed (Ruderal)

Rare Plants

- Pappose tarplant population
- Saline Clover plant population
- Contra Costa goldfields population
- ★ Pappose tarplant location point (≤ 10 plants)
- ★ Pappose tarplant location point (≥ 11 plants)
- ★ Saline clover location point (20 plants)
- ✕ Impact to Plant Point
- Impact to Plant Polygon

Solano County, CA
NAD 1983 StatePlane California II FIPS 0402 Feet
38.2375°N 121.9837°W

Aerial Photograph: 7 February 2020, 2020 Maxar Technologies Imagery, Google Earth Pro
Updated: 5/12/2022
Project No. 66497
Layout: 6497_gabrychProperty_BotanImpc22(11x17P)
Aprx: 66497_gabrychProperty



C.4 - 2022 Spring Botanical Survey Results

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TECHNICAL MEMORANDUM

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From: Michael Bower, M.S., Senior Botanist
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Email: Michael.Bower@swca.com

Date: April 29, 2022

Re: **2022 Spring Botanical Survey Results for the Suisun Logistics Center Project, Solano County, California**

INTRODUCTION

This memorandum describes the results of a second spring botanical survey for the proposed Suisun Logistics Center Project (Project). The approximately 173.17-acre biological study area (BSA) is located southeast of the intersection of Walters and Petersen Road, adjacent to Suisun City in unincorporated Solano County, California. The survey supplements the results of protocol-level botanical surveys conducted in 2021 and described within the *Biological Resources Evaluation and Botanical Inventory Report for the Suisun Logistics Project* (BRE; SWCA 2021). A primary focus of the survey was to provide a second year of appropriately timed surveys for federal endangered Contra Costa goldfields (CCG; *Lasthenia conjugens*). A total of 47 CCG plants were observed in Seasonal Wetland (SW) 51 during the April 1, 2022 survey. Pappose tarplant (*Centromadia parryi* ssp. *parryi*; California Rare Plant Rank [CRPR] 1B.2) and saline clover (*Trifolium hydrophyllum*; CRPR 1B.2) were also observed.

METHODS

Survey methods for the spring 2022 botanical survey were as described in the BRE, consistent with CDFW (2018) and USFWS (2000) survey protocols. Surveys were floristic in nature. Surveys in spring 2022 consisted of three site visits as follows:

- On March 10, 2022, biologist Alex Jamal conducted a reconnaissance-level botanical survey that included inspection of wetlands in the BSA.

- On March 17, 2022, botanist Mike Bower, M.S., and Mr. Jamal visited the CCG reference population and walked survey transects covering the entire BSA.
- On April 1, 2022, Mr. Bower and biologist Alec Villanueva visited the CCG reference population and walked through the entire BSA closely inspecting wetlands and other habitats with greater potential for special-status plants.

Approximately 32 hours were spent conducting the spring 2022 botanical survey with additional time spent keying specimens collected in the field.

The botanical survey included a visit to a CCG reference population located approximately 0.75 mile southeast of the BSA in alkali playa habitat along Scally Lane. Thousands of CCG plants were observed in flower in the reference population on March 17, 2022. Many thousands of CCG plants were observed in flower and early fruit at the reference population on April 1, 2022.

RESULTS & DISCUSSION

A cumulative list of plant species observed in the BSA is in Attachment A. Photographs of the BSA and the reference population are in Attachment B. An updated map of botanical resources is in Attachment C.

Site Conditions: Site conditions in 2022 were similar to those documented in 2021. There were no changes to the natural communities mapped within the BSA in 2021 (SWCA 2021). No cultivation occurred in the BSA in 2022, and the site had not recently been grazed with livestock, providing good survey conditions. Based on data from the nearby Fairfield Gauge (FRF), approximately 19.88 inches of precipitation were received during the period of 1 October 2021 through 1 April 2022 (approximately 91.4% of normal). This precipitation arrived mostly in a series of large storms early in winter, which filled pools on the site. Drier-than-normal conditions following the storms may have accelerated plant phenology (the timing of plant germination, growth, flowering, and fruiting), but did not otherwise appear to have affected vegetation in the BSA.

Contra Costa Goldfields: A total of 47 CCG plants were observed near the western edge of the site on April 1, 2022 (see photos 7 and 8 in Attachment B and map in Attachment C). The plants were restricted to SW 51, in an area where development is contemplated. No other CCG plants were observed in the BSA. The CCG plants were growing with *Downingia concolor* var. *concolor*, *Lythrum hyssopifolia*, and *Plagiobothrys stipitatus* var. *micranthus*. SW 51 is 0.03 acre in size and was never observed with inundation (SWCA 2021).

Potential CCG habitat in the northern portion of the BSA has been degraded by cultivation, altered hydrology from ditches and road berms, invasion by nonnative grasses, and the presence of Fremont's goldfields (*Lasthenia fremontii*), which are known to hybridize with CCG. Hybrids are thought to be sterile and adversely affect CCG recruitment (LSA 2010). Fremont's goldfields were observed in many of the wetlands in the BSA, including SW 08 located near SW 51. LSA (2010) describe hybrids as possessing a mixture of traits between CCG and Fremont's goldfields (specifically, free phyllaries – a characteristic of Fremont's goldfields, and fruit without pappus – a characteristic of CCG). The specimens of CCG

examined in the offsite reference population and onsite in SW 51 possessed only the characteristics of CCG. No potential *Lasthenia* hybrids were observed.

The CCG specimens collected from the reference population and SW 51 were deposited at the UCD Herbarium on April 26th, 2022. Qualified herbarium staff examined the specimens and compared them with other CCG specimens in their collection. The herbarium staff confirmed that the specimens were correctly identified as CCG.

Other Special-Status Plants: Populations of pappose tarplant (seedlings) and saline clover (in flower) were observed in approximately the same locations documented during the 2021 botanical surveys (see Figure 5 in the BRE; SWCA 2021). Twenty additional saline clover plants were observed in 2022 in a new location in the central-southern portion of the BSA. The plants at this new location were added to the map in Attachment C. The additional saline clover plants observed in 2022 remain well south of proposed development.

LITERATURE CITED

- LSA Associates, Inc. (LSA). 30 June 2010. The status and distribution of Contra Costa goldfields in Solano County, California. Submitted to Solano County Water Agency. LSA Project No. SCD430, SCD0601, SWG0701, SWG0801, SWG0901. Point Richmond, CA.
- SWCA Environmental Consultants (SWCA). October 2021. Biological Resources Evaluation and Botanical Inventory Report for the Suisun Logistics Project. Prepared for Buzz Oates Enterprises. SWCA Environmental Consultants, Sacramento, CA.

Attachment A

Cumulative List of Plant Species Observed in the BSA Based on Botanical Surveys Conducted in 2021 and 2022

Family	Scientific Name ¹	Common Name	N/I ²	Cal-IPC ³
EUDICOTS				
Apiaceae	<i>Conium maculatum</i>	Poison hemlock	I	Moderate
	<i>Eryngium aristulatum</i> var. <i>aristulatum</i>	Eryngium	N	
	<i>Lomatium utriculatum</i>	Lomatium	N	
	<i>Foeniculum vulgare</i>	Fennel	I	High
Apocynaceae	<i>Asclepias fascicularis</i>	Narrow-leaf milkweed	N	
Asteraceae	<i>Achyrachaena mollis</i>	Blow-wives	N	
	<i>Anthemis cotula</i>	Mayweed	I	
	<i>Carduus pycnocephalus</i> ssp. <i>pycnocephalus</i>	Italian thistle	I	Moderate
	<i>Centaurea calcitrapa</i>	Purple star-thistle	I	Moderate
	<i>Centaurea solstitialis</i>	Yellow star-thistle	I	High
	<i>Centromadia parryi</i> ssp. <i>parryi</i>	Pappose tarplant	N	
	<i>Cichorium intybus</i>	Chicory	I	
	<i>Cotula coronopifolia</i>	Brass-buttons	I	Limited
	<i>Dittrichia graveolens</i>	Stinkwort	I	Moderate
	<i>Grindelia camporum</i>	Gumplant	N	
	<i>Helminthotheca echioides</i>	Bristly ox-tongue	I	Limited
	<i>Hemizonia congesta</i> ssp. <i>luzulifolia</i>	Hayfield tarweed	N	
	<i>Hypochaeris glabra</i>	Smooth cat's-ear	I	Limited
	<i>Lactuca serriola</i>	Lettuce	I	
	<i>Lasthenia californica</i> ssp. <i>californica</i>	California goldfields	N	
	<i>Lasthenia conjugens</i>	Contra Costa goldfields	N	
	<i>Lasthenia fremontii</i>	Fremont's goldfields	N	
	<i>Lasthenia glaberrima</i>	Smooth goldfields	N	
	<i>Layia fremontii</i>	Layia	N	
	<i>Psilocarphus oregonus</i>	Oregon woollyheads	N	
	<i>Psilocarphus tenellus</i>	Slender woolly-marbles	N	
	<i>Senecio vulgaris</i>	Common groundsel	I	
	<i>Sonchus oleraceus</i>	Common sow thistle	I	
	<i>Symphotrichum chilense</i>	American-aster	N	
	<i>Tragopogon</i> sp.	Goat's beard, salsify	I	
	<i>Xanthium strumarium</i>	Cocklebur	N	
Betulaceae	<i>Alnus rhombifolia</i>	White alder	N	
Boraginaceae	<i>Amsinckia</i> sp.	Fiddleneck	N	
	<i>Plagiobothrys greenei</i>	Greene's spiny-nut popcorn flower	N	
	<i>Plagiobothrys stipitatus</i> var. <i>micranthus</i>	Great Valley popcornflower	N	
Brassicaceae	<i>Brassica rapa</i>	Turnip, field mustard	I	Limited
	<i>Capsella bursa-pastoris</i>	Shepherd's purse	I	
	<i>Lepidium latifolium</i>	Perennial pepperweed	I	High
	<i>Hirschfeldia incana</i>	Summer mustard	I	Moderate
	<i>Raphanus sativus</i>	Radish	I	Limited
Campanulaceae	<i>Downingia concolor</i> var. <i>concolor</i>	Downingia	N	
Caryophyllaceae	<i>Cerastium glomeratum</i>	Sticky mouse-ear chickweed	I	
	<i>Spergularia macrotheca</i> var. <i>leucantha</i>	Sticky sand-spurrey	N	
	<i>Stellaria media</i>	Common chickweed	I	

Family	Scientific Name ¹	Common Name	N/I ²	Cal-IPC ³	
Chenopodiaceae	<i>Atriplex prostrata</i>	Fat-hen	I		
	<i>Salicornia depressa</i>	Pickleweed	N		
	<i>Salicornia pacifica</i>	Pickleweed	N		
Convolvulaceae	<i>Convolvulus arvensis</i>	Bindweed, orchard morning-glory	I		
	<i>Cressa truxillensis</i>	Alkali weed	N		
Fabaceae	<i>Lotus corniculatus</i>	Bird's-foot trefoil	I		
	<i>Lupinus bicolor</i>	Miniature lupine	N		
	<i>Medicago polymorpha</i>	California burclover	I	Limited	
	<i>Melilotus indicus</i>	Sourclover	I		
	<i>Trifolium depauperatum</i> var. <i>depauperatum</i>	Dwarf sack clover	N		
	<i>Trifolium dubium</i>	Little hop clover	I		
	<i>Trifolium fucatum</i>	Bull clover	N		
	<i>Trifolium glomeratum</i>	Clustered clover	I		
	<i>Trifolium hirtum</i>	Rose clover	I	Limited	
	<i>Trifolium hydrophilum</i>	Saline clover	N		
	<i>Trifolium repens</i>	White clover	I		
	<i>Trifolium subterraneum</i>	Subterranean clover	I		
	<i>Trifolium tomentosum</i>	Woolly clover	I		
	<i>Trifolium variegatum</i> var. <i>major</i>	Large variegated clover	N		
	<i>Vicia sativa</i>	Vetch	I		
	<i>Vicia villosa</i>	Hairy vetch, winter vetch	I		
	Frankeniaceae	<i>Frankenia salina</i>	Alkali heath	N	
	Geraniaceae	<i>Erodium botrys</i>	Storksbill, filaree	I	
		<i>Erodium moschatum</i>	Greenstem filaree	I	
<i>Geranium molle</i>		Cranesbill, geranium	I		
<i>Geranium</i> sp.		Cranesbill, geranium	--		
Lythraceae	<i>Lythrum hyssopifolia</i>	Loosestrife	I	Limited	
Malvaceae	<i>Malva</i> sp.	Mallow	--		
	<i>Malvella leprosa</i>	Alkali-mallow, white-weed	N		
	<i>Sidalcea malviflora</i> ssp. <i>laciniata</i>	Geranium-leaved checkerbloom	N		
Oleaceae	<i>Fraxinus</i> sp.	Ash	N		
Onagraceae	<i>Epilobium densiflorum</i>	Willowherb	N		
	<i>Ludwigia hexapetala</i>	Uruguayan primrose-willow	I	High	
Orobanchaceae	<i>Castilleja attenuata</i>	Valley tassels	N		
	<i>Parentucellia viscosa</i>	Parentucellia	I	Limited	
	<i>Triphysaria eriantha</i>	Butter-and-eggs	N		
Plantaginaceae	<i>Callitriche marginata</i>	Water-starwort	N		
	<i>Plantago lanceolata</i>	English plantain	I		
	<i>Plantago</i> sp.	Plantain	--		
	<i>Veronica peregrina</i> ssp. <i>xalapensis</i>	Purslane speedwell	N		
Polygonaceae	<i>Persicaria</i> sp.	Smartweed	--		
	<i>Polygonum aviculare</i> ssp. <i>depressum</i>	Knotweed	I		
	<i>Rumex crispus</i>	Curly dock	I	Limited	
	<i>Rumex pulcher</i>	Fiddle dock	I		
Ranunculaceae	<i>Ranunculus californicus</i>	Buttercup	N		
	<i>Ranunculus muricatus</i>	Buttercup	I		
	<i>Myosurus minimus</i>	Mousetail	N		
	<i>Myosurus sessilis</i>	Mousetail	N		
Rubiaceae	<i>Galium aparine</i>	Goose grass	N		
Salicaceae	<i>Populus nigra</i>	Black poplar, Lombardy poplar	I		

Family	Scientific Name ¹	Common Name	N/I ²	Cal-IPC ³	
MONOCOTS					
Alismataceae	<i>Alisma lanceolatum</i>	Water-plantain	I		
Cyperaceae	<i>Bolboschoenus maritimus</i> ssp. <i>paludosus</i>	Saltmarsh bulrush, alkali bulrush	N		
	<i>Eleocharis macrostachya</i>	Spikerush	N		
	<i>Schoenoplectus acutus</i> var. <i>occidentalis</i>	Common tule	N		
Juncaceae	<i>Juncus balticus</i> ssp. <i>ater</i>	Baltic rush	N		
	<i>Juncus bufonius</i>	Toad rush	N		
	<i>Juncus</i> sp.	Rush	--		
	<i>Juncus xiphioides</i>	Iris-leaved rush	N		
Juncaginaceae	<i>Triglochin scilloides</i>	Flowering-quillwort	N		
Poaceae	<i>Avena</i> sp.	Oat	I		
	<i>Briza minor</i>	Annual quaking grass, small quaking grass	I		
	<i>Bromus</i> sp.	Brome, chess	--		
	<i>Bromus diandrus</i>	Ripgut grass	I	Moderate	
	<i>Bromus hordeaceus</i>	Soft chess	I	Limited	
	<i>Crypsis schoenoides</i>	Swamp prickle grass	I		
	<i>Distichlis spicata</i>	Salt grass	N		
	<i>Elymus caput-medusae</i>	Medusa head	I	High	
	<i>Festuca</i> sp.	Fescue, rye grass	--		
	<i>Festuca bromoides</i>	Brome fescue	I		
	<i>Festuca perennis</i>	Rye grass	I	Moderate	
	<i>Glyceria</i> sp.	Manna grass	--		
	<i>Hordeum brachyantherum</i>	Barley	N		
	<i>Hordeum marinum</i> ssp. <i>gussoneanum</i>	Mediterranean barley	I	Moderate	
	<i>Hordeum murinum</i> ssp. <i>leporinum</i>	Hare barley	I	Moderate	
	<i>Parapholis incurva</i>	Sickle grass	I		
	<i>Paspalum dilatatum</i>	Dallis grass	I		
	<i>Pleuropogon californicus</i>	Semaphore grass	N		
	<i>Phalaris aquatica</i>	Harding grass	I		
	<i>Poa annua</i>	Annual blue grass	I		
	<i>Poa bulbosa</i>	Blue grass	I		
	<i>Stipa pulchra</i>	Purple needle grass	N		
	<i>Triticum aestivum</i>	Wheat	I		
	Themidaceae	<i>Brodiaea elegans</i> ssp. <i>elegans</i>	Harvest brodiaea	N	
		<i>Dichelostemma capitatum</i>	Blue dicks	N	
		<i>Muilla maritima</i>	Common muilla	N	
	Typhaceae	<i>Typha domingensis</i>	Southern cattail	N	
		<i>Typha latifolia</i>	Broad-leaved cattail	N	

¹ Nomenclature and taxonomy follow *The Jepson manual: Vascular plants of California*, 2nd ed. (Baldwin et al., eds. 2012).

² N = Native to California; I = Introduced.

³ Negative ecological impact ranking by the California Invasive Plant Council.

Attachment B

Photographs



Photo 1. View north in the eastern portion of the BSA. Yellow flowers are butter-and-eggs (*Triphysaria eriantha*). Rye grass (*Festuca perennis*) is dominant. March 17, 2022.



Photo 2. View northeast in the central portion of the BSA. Yellow flowers are butter-and-eggs. Rye grass is dominant. March 17, 2022.



Photo 3. View east in southeast portion of the BSA just north of SR 12. Yellow flowers are a mixture of brass buttons (*Cotula coronopifolia*) and smooth goldfields (*Lasthenia glabberima*). March 17, 2022.



Photo 4. View north in the western portion of the BSA. Seasonal wetland in foreground. Yellow flowers on top left are butter-and-eggs. March 17, 2022.



Photo 5. View of Fremont's goldfields (*Lasthenia fremontii*) observed in a seasonal wetland near the southeast corner of the BSA. March 17, 2022.

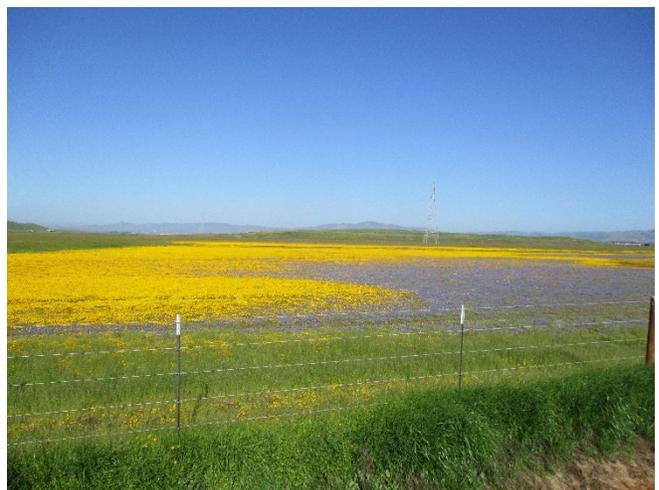


Photo 6. Contra Costa goldfields (CCG; *Lasthenia conjugens*) in flower and fruit in the off-site reference population along Scally Road. April 1, 2022.



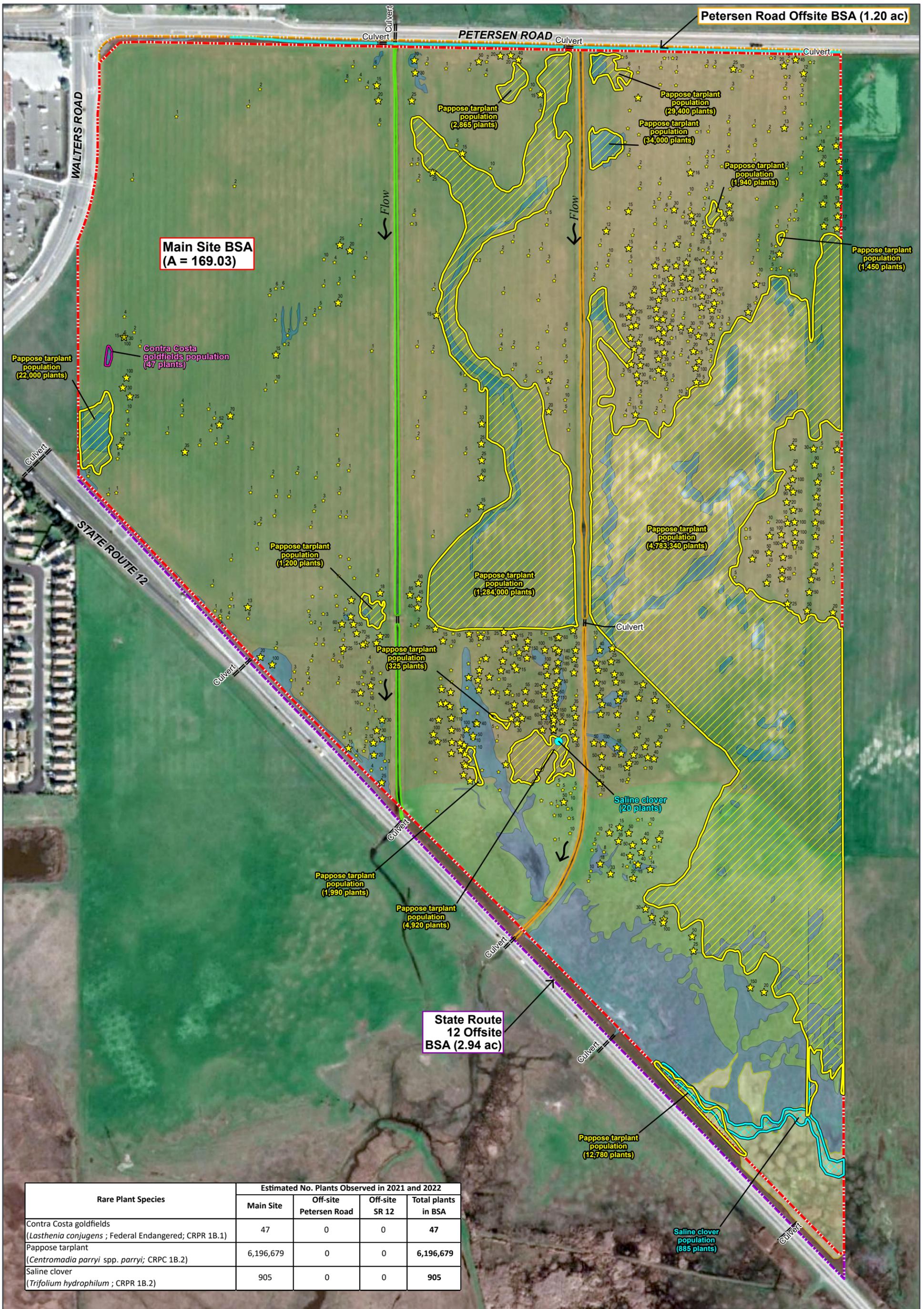
Photo 7. An individual CCG plant in flower and early fruit in Seasonal Wetland 51 in the western portion of the BSA. April 1, 2022.



Photo 8. A close-up view of CCG observed within Seasonal Wetland 51 showing partially fused phyllaries (one diagnostic feature). April 1, 2022.

Attachment C

Updated Map of Botanical Resources
Incorporating Results of Botanical Surveys in 2021 and 2022



Rare Plant Species	Estimated No. Plants Observed in 2021 and 2022			
	Main Site	Off-site Petersen Road	Off-site SR 12	Total plants in BSA
Contra Costa goldfields (<i>Lasthenia conjugens</i> ; Federal Endangered; CRPR 1B.1)	47	0	0	47
Pappose tarplant (<i>Centromadia parryi</i> spp. <i>parryi</i> ; CRPC 1B.2)	6,196,679	0	0	6,196,679
Saline clover (<i>Trifolium hydrophilum</i> ; CRPR 1B.2)	905	0	0	905

SUISUN LOGISTICS CENTER PROJECT

Rare Plants Observed in 2021 and 2022

- Legend**
- Main Site Biological Study Area (BSA; 169.03 ac)
 - Petersen Road Offsite BSA (1.20 ac)
 - State Route 12 Offsite BSA (2.94 ac)
 - Culvert

- Natural Communities**
- Drainage Ditch (Roadside Ditch)
 - Drainage Ditch (Seasonal Wetland)
 - Drainage Ditch (Freshwater Marsh)
 - Seasonal Wetland
 - Coastal Brackish Marsh
 - Valley Floor Grassland
 - Alkali Meadow
 - Developed (Hardscape)
 - Developed (Ruderal)

- Rare Plants**
- Contra Costa goldfields population
 - Pappose tarplant population
 - ★ Pappose tarplant location point (≤ 10 plants)
 - ★ Pappose tarplant location point (≥ 11 plants)
 - ★ Saline clover location point (20 plants)
 - Saline Clover plant population

Solano County, CA
 NAD 1983 StatePlane California II FIPS 0402 Feet
 38.2375°N 121.9837°W

Aerial Photograph: 7 February 2020, 20200 Maxar Technologies Imagery Google Earth Pro

Updated: 5/9/2022
 Project No. 66497
 Layout: 97_gabrychProperty_Botanical2022(11x17P)
 Aprx: 66497_gabrychProperty

0 140 280 Feet
 0 30 60 Meters

1:3,600

SWCA
 ENVIRONMENTAL CONSULTANTS

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C.5 - Federally-listed Large Branchiopod Sampling Report

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**FEDERALLY-LISTED LARGE BRANCHIOPOD
SAMPLING
AT THE
SUISUN LOGISTICS CENTER
SOLANO COUNTY, CALIFORNIA**



Prepared for:



BUZZ OATES CONSTRUCTION, INC.
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Contact: Joe Livaich
(916) 379-3800

Prepared by:



HELM BIOLOGICAL CONSULTING
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June 2023



**FEDERALLY-LISTED LARGE BRANCHIOPOD
SAMPLING
AT THE
SUISUN LOGISTICS CENTER
SOLANO COUNTY, CALIFORNIA**

INTRODUCTION

Helm Biological Consulting (HBC), a division of Tansley Team, Inc., was contracted by Buzz Oates Construction, Inc. to conduct protocol-level dry- and wet-season sampling for large branchiopods (fairy shrimp, tadpole shrimp, clam shrimp) that are listed as threatened or endangered under the federal Endangered Species Act (e.g., vernal pool fairy shrimp [*Branchinecta lynchi*] and vernal pool tadpole shrimp [*Lepidurus packardii*]) at the Suisun Logistics Center Project (hereafter “Project”).

The Project consists of 161.31 acres and is located on the north side of Highway 12, east of Walters Road, and immediately south of Petersen Road, Solano County, California (Figure 1). Additionally, the Project is located within an unsectioned portion (roughly the Northwest ¼ and the Northeast ¼ of the Southeast ¼ of Section 33) of Township 5 North, Range 1 West, and Mount Diablo Base and Meridian of the Denver 7.5-minute U.S. Geological Survey topographic quadrangle map; approximate center coordinates (North American Datum 1983[NAD83]) are: 38.239186, -121.983123 (Figure 2).



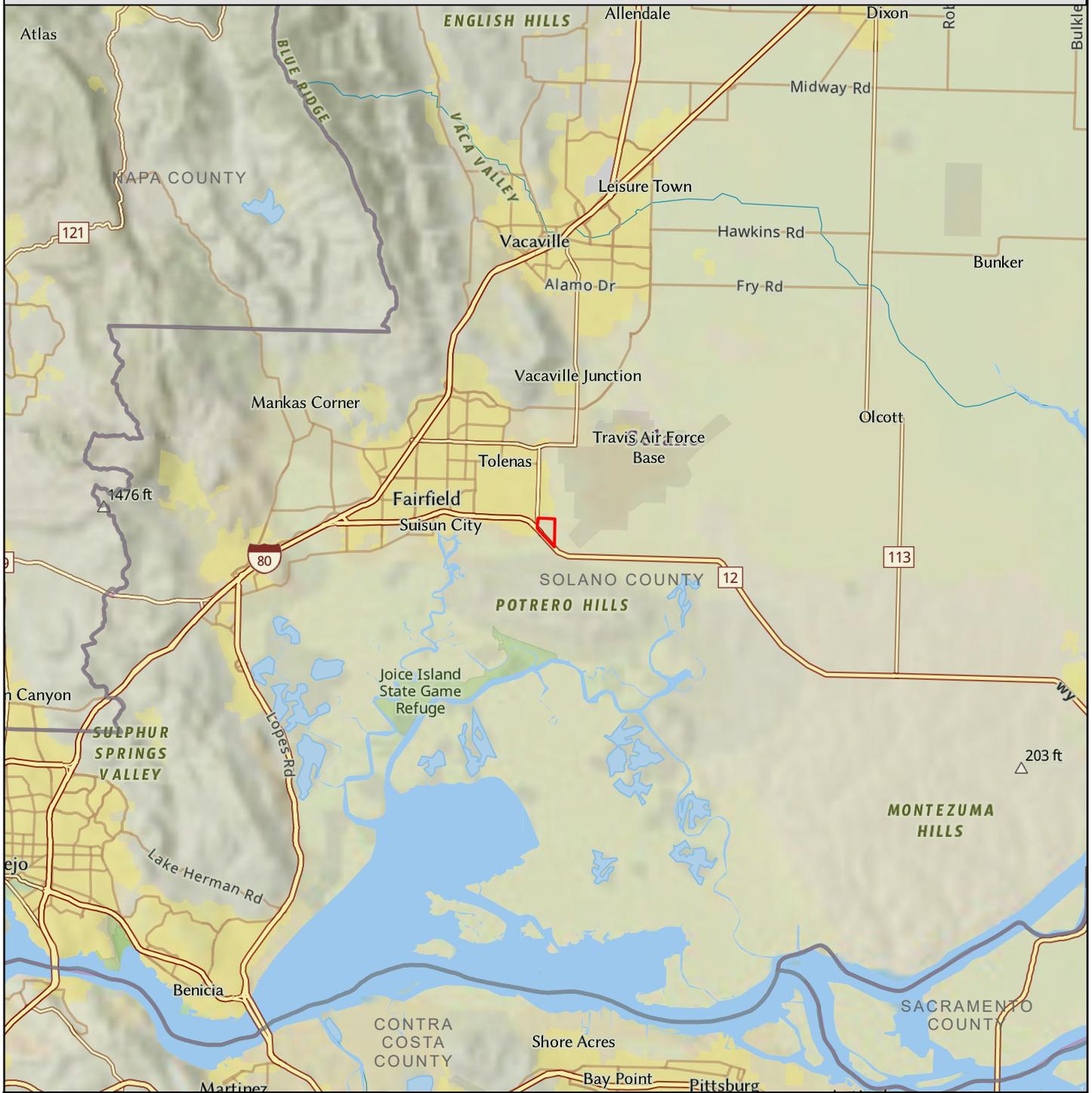
“I certify that the information in this survey report and attached exhibits fully and accurately represents my work.”

Brent P. Helm
(TE-795930-12)

Signature *Brent P. Helm*

Date 06-13-2023

SUISUN LOGISTICS CENTER PROJECT, SOLANO COUNTY, CALIFORNIA



0 2 4
Miles

N

Data Source:
USGS The National Map 2021;
ESRI USA Boundaries;
ESRI National Geographic Style
Basemap

Prepared by:
HELM
BIOLOGICAL CONSULTING
4800 Karlov Ave., Sherman, CA 95601

Date: 9/8/2022

Figure 1. Project Vicinity

SUISUN LOGISTICS CENTER PROJECT, SOLANO COUNTY, CALIFORNIA

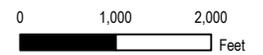


- Project Site (161.31 acres)
- USGS 24k Topo Map Boundaries

The Project Site is located within the Denverton, CA USGS 7.5-minute quadrangle map.

The site occurs within an unsectioned portion of Township 5 North and Range 1 West, Mt. Diablo Base & Meridian.

Center Coordinates (NAD83) for Study Area:
Latitude 38.239186, Longitude -121.983123



Data Source:
USGS The National Map 2021;
ESRI USA Boundaries;
Public Land Survey System

Prepared by:



Date: 9/8/2022

Figure 2. Project Location on USGS Topographic Map

METHODS

Methods followed U.S. Fish and Wildlife Service’s (USFWS 2017) *Survey Guidelines for Listed Large Branchiopods* for federally listed large branchiopod sampling and consisted of dry-season sampling and followed by wet-season sampling as described below.

DRY-SEASON SAMPLING

Dr. Brent Helm of HBC, assisted by Mr. Zachary Einweck of HBC, conducted dry-season sampling on November 28, 2022, May 30, 2023, and June 22, 2023 as authorized by the U.S. Fish and Wildlife Service (USFWS) (Appendix A) under recovery permit TE-795930-12 of Section 10(a)(1)(A) of the federal Endangered Species Act, 16 U.S.C. 1531 *et seq.*, and its implementing regulations. Hence, dry-season sampling was conducted prior to and after wet-season sampling. In a few instances dry-season sampling was not performed in habitats where federally listed large branchiopods were detected during wet season (HBC-9, HBC-14, and HBC-15) (Figure 3, base map derived from SWCA Environmental Consultants, 2021).

Dry-season sampling was conducted in all habitats within the Project with the potential to support federally-listed large branchiopods. Aerial imagery of the Project (Google Earth® 2022) was utilized to target appropriate habitats for sampling. Habitats sampled that were not previously mapped onsite were delineated with the aid of a handheld Global Positioning System (GPS) unit with sub-meter accuracy and numbered chronologically with an HBC prefix (e.g., HBC-1, HBC-2) (Figure 3).

Habitat characteristics of large branchiopods are based on the life history of Central Valley endemics (Eriksen and Belk 1999; Helm 1998, 1999; Helm and Vollmar 2002; Helm and Noyes 2016). The presence of water marks, algae mats, driftlines, hydrophytic vegetation (“water-loving plants”), slope, contributing watershed, maximum potential ponding depth, and aquatic arthropods (i.e., crustaceans and insects) exoskeletons were helpful indicators for evidence of ponding depth and duration. Habitats that swiftly flow water (e.g., creeks, streams, and ephemeral drainages), semi-to-permanently inundated areas that support population of predators (e.g., bullfrogs, fish, and crayfish), and habitats that receive water during the dry season (i.e., artificial water sources) were not generally considered suitable habitat for federally-listed large branchiopods.

Soil samples were collected mainly from the lowest topographic areas within each sampled habitat. All soil collected was dry (i.e., dry to the touch and too dry to make a ped). Soil samples were placed in liter-size plastic sealable bags and marked with the project name, habitat, and date. Representative photographs were taken of the habitats sampled (Appendix B).

SUISUN LOGISTICS CENTER PROJECT, SOLANO COUNTY, CALIFORNIA

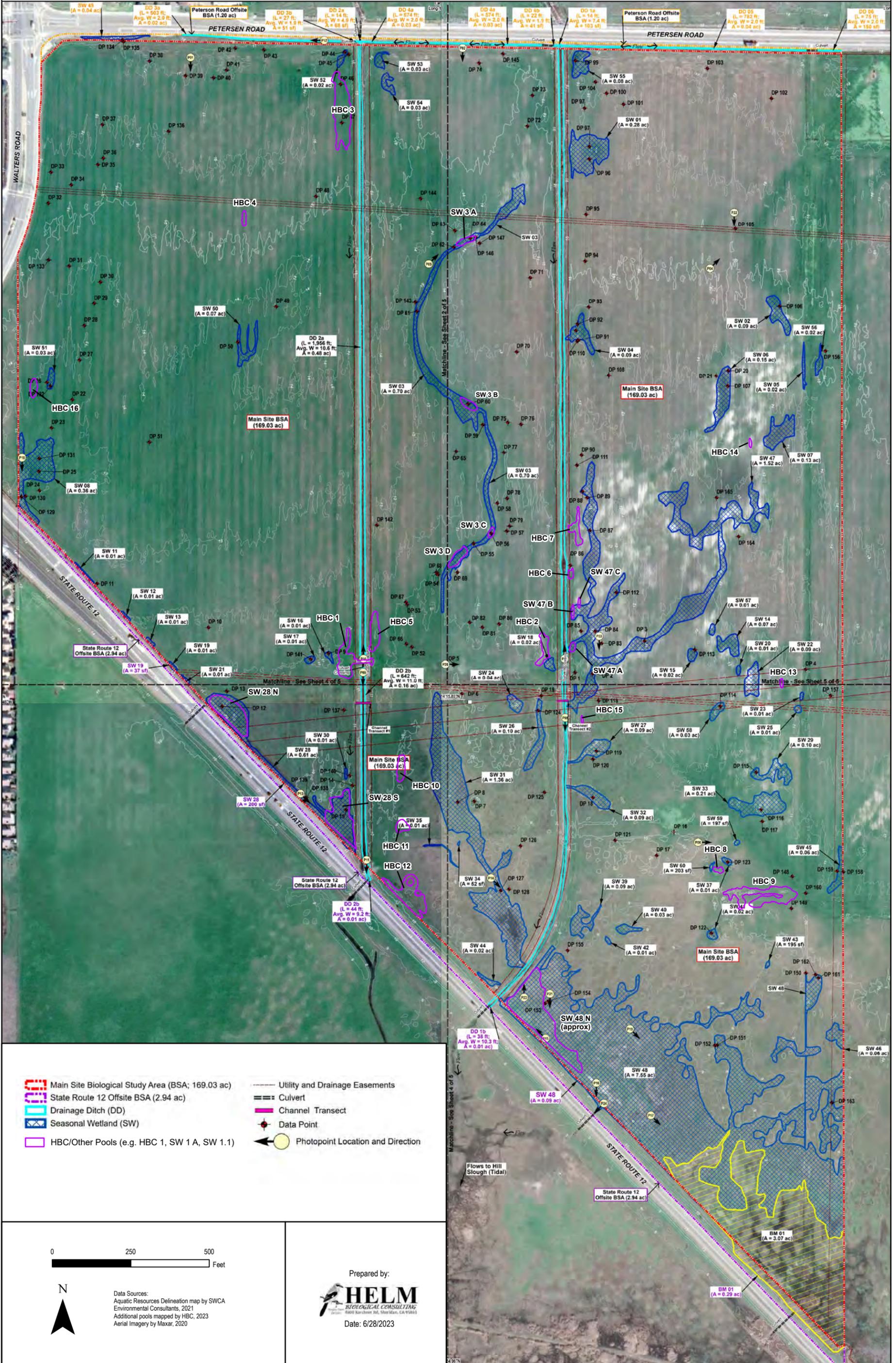


Figure 3. Sampled Pools

The soil was then transported to HBC for processing and analysis as described below.

In HBC's laboratory, a brine solution was prepared by mixing table salt (NaCl) with lukewarm tap water in a large container. The collected soil material was placed in the brine solution. The soil material was then gently worked by hand to breakdown any persistent soil structure. The organic material rising to the top of the brine solution was skimmed off and placed in a 600-micron diameter pore-size sieve stacked atop a 75-micron diameter pore-size sieve. The soil material was processed through the top sieve by flushing it with lukewarm tap water while gently rubbing it with a soft-bristle brush. The soil retained from the 75-micron diameter pore-size sieve was then removed and thinly (≈ 1.0 mm) spread into plastic petri dishes.

The contents of each petri dish were examined under a 10 to 252-power zoom binocular microscope. A minimum of 0.5-hour was spent searching the contents of each petri dish for large branchiopod cysts (embryonic eggs). Dr. Helm's large branchiopod cyst reference collection and scanning electron micrographs of cysts (Belk 1989, Brendock *et al.* 2008, Gilchrist 1978, Hill and Shepard 1998, Mura 1991, and Rabet 2010) were used to identify and compare any cysts observed within the soil samples. This processing method (described above) favors the detection of cysts belonging to the genera *Branchinecta*, *Lepidurus*, and *Streptocephalus* since these three genera have species that are federally listed. Evidence of other macroscopic aquatic invertebrates encountered was also noted on the laboratory data sheet.

WET-SEASON SAMPLING

Dr. Brent Helm, with assistance from Ms. Rachel Powell and Ms. Kathleen Colima Aguirre of HBC, conducted nine rounds of protocol-level wet-season sampling during the 2022-2023 wet-season as follows: 1st round (December 16), 2nd round (December 29), 3rd round (January 12), 4th round (January 26), 5th round (February 9), 6th round (February 22), 7th round (March 9), 8th round (March 23), and 9th round (April 6). In addition, the last pool to have water on site (SW-31) was sampled on April 24, 2023, by Dr. Brent Helm and Mrs. Monica Helm with a seine.

The wet-season sampling was conducted under permit TE-795930-12 of Section 10(a)(1)(A) of the federal Endangered Species Act, 16 U.S.C. 1531 *et seq.*, and its implementing regulations as authorized by the USFWS (Appendix A). Methods followed USFWS's (2017) *Survey Guidelines for Listed Large Branchiopods* for wet-season sampling as described below.

Wet-season sampling was conducted in all habitats on site that had potential to support federally-listed large branchiopods. An aerial imagery of the Project (Google Earth[®] 2022) was utilized to target appropriate habitats for sampling. Habitats sampled that were not previously mapped onsite were delineated with the aid of a handheld GPS unit with sub-meter accuracy and numbered chronologically with an HBC prefix.

Potential habitat for federally-listed large branchiopods is defined as any seasonal inundated depression that on average ponds water at a sufficient depth and duration for a listed-large branchiopod to complete its lifecycle (generally 2.0 inches or greater in depth for 14 or more consecutive days for fairy shrimp and 30 or more consecutive days for tadpole shrimp) (USFWS 2017). Generally, these habitats occur within the California Floristic Province at elevations below 1,707 meters in the Coast Ranges (CNDDDB #178) and below 914 meters for the rest of California and Oregon (CNDDDB #244) and Oregon (USFWS 2017). Habitats that swiftly flow water (e.g., creeks, streams, and ephemeral drainages), semi-to-permanently inundated areas that support perennial population of predators (e.g., bullfrogs, fish, and crayfish), and habitats that receive water during the dry season (i.e., artificial water sources) were not generally considered suitable habitat for federally-listed large branchiopods (USFWS 2017).

According to the USFWS (2017), the Project is within Survey Zone A (Southern Oregon, Sacramento Valley, San Francisco Bay Area, North Coast Ranges, Northern Sierra Valley Foothills, Cascade Range foothills, and South Coast Ranges) (USFWS 2017). Therefore wet-season sampling was initiated 14 days after any of the habitats on site (determined to potential large branchiopod habitat) ponded a minimum of 3 centimeters (cm) of standing water. In cases when the habitats dried and refilled the 90 days would start over. Specific sampling methods are described below.

Each habitat was viewed for active large branchiopods prior to entering the water. Any large branchiopods observed were quickly netted, viewed with the aid of a 30x hand lens to determine species, and released unharmed back into the environment from which they were obtained. If no large branchiopods were observed, then a semi-quantitative sample was taken to determine the relative abundance of large branchiopods as follows.

A dip net was lowered vertically into the deepest portion of the inundated habitat (usually the center) and rested on the bottom. The 80- μ m mesh size dip net was then moved in the direction of the longest axis of the habitat for approximately one-meter. In instances where half of the habitat length is less than one meter in length, the dip net was repositioned in the deepest portion of the habitat and moved in the opposite direction for the remainder of the one-meter sample. Given the aperture of the dip net of 0.025 m² and distance the dip net was moved, roughly 0.025 m³ or 25 liters of the water column was sampled horizontally each time. In those cases when the water column was shallower than the dip net aperture height, the volume of water per sweep was calculated by the horizontal distance the net is moved multiplied by the width of the dip net (25-cm) multiplied by the depth of water. After the completion of each sample sweep, the contents of the net were examined for large branchiopods. All large branchiopods captured in the dip net were identified to the lowest justifiable taxon in the field and recorded on standardized data sheets. The relative numbers of individuals observed within each taxonomic group was recorded in one of five categories: rare (≤ 2 individuals), not common (3-10 individuals), common (11-50 individual), very common (51 -100 individuals), and abundant (>100 individuals). This method allows for the relative abundances and richness of large branchiopods to be compared between

and among wetlands through time. Additionally, this method allows for concentration estimates of large branchiopods to be calculated as number of individuals per liter of water (= number of individuals/net aperture area x length of sweep).

If federally-listed large branchiopods were not detected during the semi-quantified sampling method, then the entire habitat was sampled as follows. Starting at one end of the habitat, the net was moved from one side of the habitat to the other in a zig-zag fashion, until the opposite end of the habitat was reached. During this procedure, the net was often bounced along the habitat bottom (to encourage large branchiopods to move up into the water column from hiding places for easier capture) and viewed often for evidence of large branchiopods. If still no federally-listed large branchiopods were captured, then additional netting took place in specific locations within the habitat that may have not been sampled during prior efforts. Additional taxonomic groups of large branchiopods detected using this alternative method is noted as present by an “X” on the standardized field data sheet. After the taxonomic identification and enumeration were completed, the contents of the net were placed back into the habitat from which they were collected.

Data concerning air and water temperatures, present depths (maximum and average [ft]), present ponding surface area (ft²), and habitat conditions were collected during each field visit. The potential depths (maximum and average [ft]) and potential ponding surface area (ft²) were estimated. Additionally, presence and abundance data were recorded for all other aquatic species using the same methods as described above for large branchiopod sampling. Representative photographs were taken of the habitats sampled and species observed (Appendix B).

RESULTS

SWCA Environmental Consultants mapped a total of 67 wetland areas at the Project (SWCA Environmental Consultants 2021) (Figure 3). Four of these wetland areas that occurred on site (BM-01, DD-1a, DD-2a, SW-48 [only a small portion in the south of SW-48 ponded water]) were not considered suitable habitat for federally-listed large branchiopods because they exhibit one or more of the following characteristics: support predatory fish; swiftly flow water; inundated perennial or semi perennial; and /or do not pond water (instead stay saturated to the surface for extended periods). There were some habitats that occurred offsite and therefore were not sampled during the wet-sampling season (SW-49, DD-1B, DD-2B, DD-3A, DD-3B, DD-4A, DD-4B, DD-05, and DD-06). However, to be conservative, soil samples were collected during dry-season sampling. Furthermore, HBC determined 26 new (HBC-1 to HBC- 16) or adjusted habitats (SW-28N, SW-28S, SW-48N, SW-3A, SW-3B, SW-3C, SW-3D, SW-47A, SW-47B, and SW-47C), within the project as having potential to support federally-listed large branchiopods. The adjusted habitats were small areas that were considered large branchiopod habitat within larger wetland areas. In total, 68 habitats were sampled for federally-listed large branchiopods that occurred on site using both dry-and wet-season sampling techniques described above.

DRY-SEASON SAMPLING

Soils collected from a total of 77 habitats were analyzed (Figure 3). As described above, nine of the habitats sampled occur off site. Cysts belonging to the genus *Branchinecta* were found in soils collected from 19 of the habitats sampled (Table 1). None of the off-site habitats had evidence of federally-listed large branchiopods. No evidence of cysts or carapaces belonging to the genus *Lepidurus* were observed in the soils collected. Representative photographs of the habitats sampled are provided in Appendix B.

WET-SEASON SAMPLING

A total of 71 habitats were sampled using wet-season techniques (Appendix C). After nine rounds of wet-season sampling, the federally-listed as “threatened” vernal pool fairy shrimp was identified from 25 habitats (SW-2, SW-5, SW-7, SW-14, SW-15, SW-20, SW-22, SW-23, SW-25, SW-32, SW-33, SW-37, SW-41, SW-42, SW-53, SW-54, SW-56, SW-57, SW-58, SW-59, SW-60, HBC-9, HBC-14, HBC-13 and HBC-15) (Figure 3 and Appendix C).

Additionally, the non-special-status California fairy shrimp (*Linderiella occidentalis*) was detected onsite in four different habitats (SW-47A, SW-47B, SW47C, and HBC-6). No other large branchiopod species were detected at the Project. Representative photographs of the habitats sampled are provided in Appendix B. Field data forms from each wet-season sampling date are provided in Appendix C.

Table 1. Results of Soil Examinations

Habitat No.	Insect Exo-Skeletons	Micro-Turbellaria Cysts	Cladocera Ehippia	Ostracods Live/Cysts/Carapaces	Large Branchiopod Cysts	Hydracarina Live	Nematoda	Collembola	Sampling date
					<i>Branchinecta</i> sp.				
DD-3a,3b,2a,4a,4b,1a,05									
HBC-01	X					X	X	X	5/30/2023
HBC-02	X	X		X				X	6/22/2023
HBC-03	X							X	6/22/2023
HBC-04	X	X				X	X	X	6/22/2023
HBC-05	X		X					X	6/22/2023
HBC-06	X	X						X	6/22/2023
HBC-07	X		X			X	X	X	6/22/2023
HBC-08	X				2+Pieces		X	X	6/22/2023
HBC-10	X						X	X	6/22/2023
HBC-11	X							X	6/22/2023
HBC-12	X						X	X	6/22/2023
HBC-13	X			X	M		X	X	6/22/2023
HBC-16	X					X	X	X	1/0/1900
SW-01	X			X				X	11/28/2023
SW-02	X					X	X	X	5/30/2023
SW-03 A	X		X	X			X	X	6/22/2023
SW-03 B	X		X	X			X	X	6/22/2023
SW-03 C	X		X	X			X	X	6/22/2023
SW-03 D	X		X	X			X	X	6/22/2023
SW-04	X		X	X		X	X	X	11/28/2023
SW-05	X				M		X	X	5/30/2023
SW-06	X							X	5/30/2023
SW-07	X	X					X	X	5/30/2023
SW-08	X		X	X		X	X	X	11/28/2023
SW-11	X						X	X	5/30/2023
SW-12	X						X	X	5/30/2023
SW-13	X	X			L		X	X	5/30/2023
SW-14	X					X		X	11/28/2023
SW-15	X		X		M			X	11/28/2023
SW-16	X					X		X	11/28/2023
SW-17	X					X		X	11/28/2023
SW-18	X	X		X			X	X	5/30/2023
SW-19	X						X	X	5/30/2023
SW-20	X					X	X	X	11/28/2023
SW-21	X			X			X	X	5/30/2023
SW-22	X							X	11/28/2023
SW-23 (True)	X		X		H			X	11/28/2023
SW-24	X	X	X	X	L		X	X	5/30/2023
SW-25	X		X	X	H	X	X	X	11/28/2023
SW-26	X	X	X	X	H	X	X	X	11/28/2023
SW-27	X			X		X		X	11/28/2023
SW-28 N	X	X	X	X		X	X	X	6/22/2023
SW-28 S	X	X	X	X		X	X	X	6/22/2023
SW-29	X				L	X	X	X	5/30/2023
SW-30	X		X					X	11/28/2023
SW-31	X		X			X		X	11/28/2023
SW-32	X		X			X	X	X	11/28/2023
SW-33	X	X	X	X	L		X	X	5/30/2023
SW-34	X	X						X	5/30/2023
SW-35	X			X			X	X	5/30/2023
SW-37	X				M	X	X	X	11/28/2023
SW-39	X	X						X	5/30/2023
SW-40	X						X	X	5/30/2023
SW-41	X	X	X		L		X	X	5/30/2023
SW-42	X			X	M		X	X	11/28/2023
SW-43	X							X	5/30/2023
SW-44	X		X	X		X	X	X	5/30/2023
SW-45	X						X	X	5/30/2023
SW-46	X		X					X	5/30/2023
SW-47 A	X		X	X			X	X	6/22/2023
SW-47 B	X		X	X				X	6/22/2023
SW-47 C	X		X			X	X	X	6/22/2023
SW-48 N	X	X	X				X	X	6/22/2023
SW-49	X	X					X	X	5/30/2023
SW-50	X							X	11/28/2023
SW-51	X					X		X	11/28/2023
SW-52	X							X	11/28/2023
SW-53	X				M			X	11/28/2023
SW-54	X				M			X	11/28/2023
SW-55	X		X			X	X	X	11/28/2023
SW-56	X					X		X	11/28/2023
SW-57	X				L		X	X	5/30/2023
SW-58	X		X				X	X	5/30/2023
SW-59	X			X	M			X	11/28/2023
SW-60	X				M			X	11/28/2023

X=Present

*Abundance categories are derived from USFWS's Survey Guidelines for the Listed Large Branchiopods - Section VI(c) (none = no cysts found in sample; low abundance = estimate of 1-10 cysts/100 ml soil; medium abundance = estimate of 11-50 cysts/100 ml soil; high abundance = estimate of more than 50 cysts/100 ml soil)

DISCUSSION

The 2022-2023 wet-season had significantly higher rainfall compared to the average rainfall (Weather Underground 2023). Many of the habitats overflowed into adjacent ones. Taking this into consideration, there were several cases where the vernal pool fairy shrimp was found in habitats during wet-season sampling but not in the same habitat during dry-season sampling (no *Branchinecta* sp. cysts found). While this is rare, the amount of rainfall that occurred could have allowed the vernal pool fairy shrimp to have access to a greater number of prior unoccupied habitats.

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APPENDIX A.
USFWS AUTHORIZATION



Brent Helm <bhelm@tansleyteam.com>

Survey Notification Approval, wet/dry season VpB surveys, Suisun Logistics Center Project, TE-795930-10.2

1 message

SFWO Permits, FW8 <FW8_SFWO_Permits@fws.gov>

Fri, Sep 16, 2022 at 3:52 PM

To: Brent Helm <bhelm@tansleyteam.com>

Cc: "rpowell@tansleyteam.com" <rpowell@tansleyteam.com>, "Cook, Megan T" <megan_cook@fws.gov>

Brent Helm,

By this email message, you are authorized to conduct protocol-level dry and wet season vernal pool branchiopod surveys, as specified in your September 8, 2022 email request, per the conditions of your recovery permit (TE-795930-10.2). Surveys will be conducted at the Suisun Logistics Center Project, Solano County, CA.

Surveys may be conducted within all wetlands identified on-site that might provide suitable habitat. Suitable habitat not previously identified on the project site may also be sampled under this authorization. Please remember to carry a copy of your permit while doing the work and to follow the terms and conditions therein. This authorization does not include access to the property which must be arranged with the landowner or manager.

In your report(s), please include which activities were authorized, the names of all persons involved in each activity, their recovery permit numbers, if applicable, and the date of this authorization, to help ensure that we correctly record the fulfillment of the reporting requirement under this authorization. Please let us know if the activities are not performed as authorized, or if they are done by a different permittee under a separate authorization. Reports should include a U.S. Geological Survey topographic map (1:24,000 scale) depicting the location of the project site, survey area, and location(s) of species in as precise a manner as possible. We may also request spatial data and metadata. **Please send electronic copies of the report(s) to FW8_SFWO_Permits@fws.gov and the Sacramento Valley Division Supervisor, Megan Cook (megan_cook@fws.gov).**

Thank you,
Lauren

--

10(a)(1)(A) Recovery Permit Team
Sacramento Fish and Wildlife Office
U.S. Fish and Wildlife Service



The SFWO is transitioning to a consolidated mailbox (this one!) for all communications regarding 10(a)(1)(A) recovery permits in our jurisdiction. Please send survey notifications, reports, and permit inquiries (aka anything and everything permit-related) to this email address: FW8_SFWO_Permits@fws.gov.





APPENDIX B. REPRESENTATIVE PHOTOGRAPHS



Photo of SW-41 facing north. Taken by Zachary Einweck on 5/30/2023.



Photo of SW-11 facing north. Taken by Zachary Einweck on 5/30/2023.



Photo of SW-19 facing north.
Taken by Zachary Einweck on



Photo of SW-21 facing north.
Taken by Zachary Einweck on



Photo of SW-35 facing north.
Taken by Zachary Einweck on



Photo of SW-24 facing north. Taken by Zachary Einweck on
5/30/2023.



Photo of SW-08 facing north. Taken by Brent Helm
on 11/28/2022.



Photo of SW-28 facing south. Taken by Brent Helm
on 11/28/2022.



Photo of SW-03 facing northwest. Taken by Brent
Helm on 11/28/2022.



Photo of SW-31 facing north. Taken by Brent Helm
on 11/28/2022.



Photo of SW-47. Taken by Brent Helm on 11/28/2022.



Photo of SW-04. Taken by Brent Helm on 11/28/2022.



Photo of SW-58 facing north. Taken by Brent Helm on 11/28/2022.



Photo of SW-27 facing north. Taken by Brent Helm on 11/28/2022.



Photo of SW-48 facing west. Taken by Brent Helm on 11/28/2022.



Photo of SW-42 facing northeast. Taken by Brent Helm on 11/28/2022.



Photo of dead carp in SW-31.
Taken by Brent Helm on



Photo of red swamp crayfish
(*Procambarus clarkii*) in SW-31.



Photo of western mosquito fish
(*Gambusia affinis*) in SW-31.



Photo of sierran tree frog
(*Pseudacris sierra*) in SW-31.



Photo of SW-28N facing south.
Taken by Brent Helm on
12/29/2022.



Photo of SW-28N facing north.
Taken by Brent Helm on
12/29/2022.



Photo of SW-18 facing west.
Taken by Brent Helm on
12/29/2022.



Photo of BM-01 facing southwest.
Taken by Brent Helm on
12/29/2022.



Photo of SW-41 facing east.
Taken by Brent Helm on
12/29/2022.



Photo of SW-48 facing southwest.
Taken by Brent Helm on
12/29/2022.



APPENDIX C.
WET-SEASON FIELD DATA FORMS

Appendix C. Summary Results of Wet-season Sampling at the Suisun Logistics Center

Pool No ¹	Ostracods	Calanoida	Cyclopoda	Cladocera	Large Branchiopods ²		Dytiscidae	Notonectidae	Halipidae	Corixidae	Ephemeroptera	Culicidae	Chironomidae	Lymnaeidae	Micro-turbularia	Hydracarina	Collembola	Pseudacris
					LIOC	BRLY												
SW-1	X		X	X											X	X		
SW-2	X		X	X		X						X	X		X	X		
SW-3A	X		X	X			X	X		X					X			
SW-3B	X	X	X	X			X	X		X					X			
SW-3C	X	X	X	X			X	X		X					X			
SW-3D	X		X	X						X					X			
SW-4	X		X	X			X	X		X			X		X	X	X	X
SW-5	X		X	X		X									X			
SW-6	X		X	X			X					X			X			
SW-7	X		X	X		X									X			
SW-8	X	X	X	X					X						X		X	
SW-11	X		X	X											X		X	
SW-12	X		X	X											X		X	
SW-13	X		X	X						X					X		X	
SW-14	X	X	X	X		X									X			
SW-15	X	X	X	X		X	X			X					X	X		
SW-16	X		X	X											X			
SW-17	X		X	X											X			
SW-18	X			X											X		X	
SW-19	X		X	X								X			X	X		
SW-21	X		X												X			
SW-20	X		X	X		X									X			
SW-22	X	X	X			X									X			
SW-23	X		X	X		X									X			
SW-24	X	X	X	X						X							X	
SW-25	X		X	X		X	X			X					X			
SW-26	X		X	X														
SW-27	X		X	X					X	X								
SW-28N	X	X	X	X			X								X			X
SW-28S	X	X	X	X											X			
SW-29	X		X	X			X					X				X		
SW-30	X		X	X											X			
SW-31 ¹	X		X	X				X		X								
SW-32	X		X	X		X									X	X		
SW-33	X		X	X		X				X			X		X	X		
SW-34	X	X	X	X									X					
SW-35	X	X	X	X														
SW-37	X		X	X		X				X		X	X					
SW-39	X	X	X	X											X			
SW-40	X		X												X	X		
SW-41	X		X	X		X	X			X			X		X	X		
SW-42	X		X	X		X			X			X	X	X	X	X		
SW-43	X		X	X														
SW-44	X	X	X	X					X									
SW-45	X		X	X											X			
SW-46	X		X	X											X	X		
SW-47A	X		X	X		X									X	X	X	
SW-47B	X		X	X		X									X	X	X	
SW-47C	X		X	X		X									X			
SW-48N	X		X	X					X			X	X	X			X	
SW-50	X		X	X								X			X		X	
SW-51	X		X	X											X		X	
SW-52	X		X	X								X				X		
SW-53	X		X	X		X	X			X		X				X		
SW-54	X			X		X						X						
SW-55	X		X	X						X						X		
SW-56	X		X	X		X	X			X					X			
SW-57	X	X	X	X		X									X			
SW-58	X		X	X		X					X				X		X	
SW-59	X		X	X		X							X	X	X		X	
SW-60	X		X	X		X			X		X	X	X					
HBC-1	X	X	X	X				X		X		X	X		X			
HBC-2																		
HBC-3	X			X												X		
HBC-4				X											X			
HBC-5	X		X	X					X							X		
HBC-6	X		X	X		X											X	
HBC-7	X		X	X												X		
HBC-8																		
HBC-9	X		X	X		X									X	X		
HBC-10																		
HBC-11			X	X							X					X		
HBC-12		X		X														
HBC-13			X	X		X						X			X			
HBC-14	X		X	X		X												
HBC-15			X			X									X			
HBC-16	X			X											X		X	

¹ SW - Seasonal wetland; HBC - Helm Biological Consulting; BRLY - Branchinecta lynchi (Vernal pool fairy shrimp); Letters or decimal points represent smaller habitats within previously designated federally listed large branchiopod habitat

² LIOC - Linderiella occidentalis (California fairy shrimp); X - Present

³ SW-31 - had the presence of Sierran treefrog (*Pseudacris sierra*), western mosquitofish (*Gambusia affinis*), red swamp crawfish (*Procambarus clarkii*), and common carp (*Cyprinus carpio*)

Date: 4/10/23

Project: SUTW
 Surveyor(s): Powell, Celina, Helm

Time: 10:41 am
 Weather Cond: 30% cloud cover, breeze SW, 6 mph,
 Air Temperature/F: 57

1/2

Pool#	Water Temp	Percent Depth (meters)		Percent Area (ft ²)		Ostracods	Copepods	Cladocera	Crustacea						Insecta				Mollusca			Tardigrada			Habitat Condition	Comments												
		Max	Avg	Max	Avg				UDC	RRLV	SPIME	LEPA	LYBR	CYCA	Dytiscidae	Hydrophilidae	Halophilidae	Nemertidae	Coleoptera	Ephemeroptera	Zygoptera	Aussoptera	Culicidae	Chironomidae			Trichoptera	Lymnaeidae	Physidae	Planorbidae	Micro-tubularian	Hydracarina	Gastropoda	Other Invertebrates	Pseudoscorpia	Other		
SW 52	65	1.05	4	2	2%																																	
SW 50	60	0.5	4	1	95%																																	
SW 51	56	0.5	4	1	50%																																	
SW 51.1	64	1	5	1.5	90%																																	
SW 19	61	0.5	6	2	40%																																	
SW 17	60	2	8	3	15%																																	
SW 16	63	0.5	5	2	50%																																	
SW 1	63	2	6	3	90%																																	
SW 57	64	2	5	2	80%																																	
SW 11	68	0.5	0.25	3	1.5	50%																																
SW 24	67	0.5	2	6	85%																																	
SW 18	72	0.5	15	6	40%																																	
SW 43	73	6	9	6	50%																																	
SW 43N	71	6	8	4	60%																																	
SW 60	80	3	12	6	20%																																	
SW 7	78	3	1	8	15%																																	
SW 01	79	4	1	6	0%																																	
SW 65	78	0.5	4	1	70%																																	
SW 02	76	3	2	5	80%																																	
SW 5	79	0.5	1	5	80%																																	
SW 54	80	3	8	5	90%																																	
SW 7	76	1	5	3	10%																																	
SW 06	77	4	2	5	0%																																	
SW 29	82	4	1	5	25%																																	
SW 97	82	2	5	5	50%																																	
SW 00	78	3	1	6	60%																																	
SW 41	75	8	6	14	85%																																	
SW 46	73	2	5	4	40%																																	
SW 22	74	1	5	7	40%																																	
SW 21	72	0.5	0.5	0.5	1.5	0%																																

SW 11
 SW 11
 SW 11

Swiss Logistics

4/24/2023

Manica y Brent Helm

Pond $\begin{matrix} \text{Max} & \text{Area} \\ 9'' & 5.5'' \end{matrix}$
SW-31

3 *Pseudochironis* larvae, 5 *Gambusia* a *larva*, 1 *Corydoras*,
1 dead Corp ()

Turbid.

Greater yellow legs.

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C.6 - Habitat Assessment for California Tiger Salamander

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**HABITAT ASSESSMENT
FOR
CALIFORNIA TIGER SALAMANDER
AT THE
SUISUN LOGISTICS CENTER
SOLANO COUNTY, CALIFORNIA**



Prepared for:



BUZZ OATES CONSTRUCTION, INC.
555 Capital Mall, Suite 900
Sacramento, CA 95814
Contact: Joe Livaich
(916) 379-3800

Prepared by:



HELM BIOLOGICAL CONSULTING
4600 Karchner Road
Sheridan, CA 95681
Contact: Dr. Brent Helm
(530) 633-0220

September 2023



**HABITAT ASSESSMENT
FOR
CALIFORNIA TIGER SALAMANDER
AT THE
SUISUN LOGISTICS CENTER
SOLANO COUNTY, CALIFORNIA**

INTRODUCTION

Helm Biological Consulting (HBC) was contracted by Buzz Oates Construction Inc. to conduct an assessment of habitat for California tiger salamander (CTS - *Ambystoma californiense*) occurring at and within the vicinity of the Suisun Logistics Center Project (hereafter “Project”).

The Project consists of 161.31 acres and is located on the north side of State Highway 12, east of Walters Road, and immediately south of Petersen Road, Solano County, California (Figure 1). Additionally, the Project is located within an unsectioned portion (roughly the Northwest $\frac{1}{4}$ and the Northeast $\frac{1}{4}$ of the Southeast $\frac{1}{4}$ of Section 33) of Township 5 North, Range 1 West, and Mount Diablo Base and Meridian of the Denverton 7.5-minute U.S. Geological Survey topographic quadrangle map; approximate center coordinates in decimal degrees (North American Datum 1983 [NAD83]) are: 38.239186, -121.983123 (Figure 2).

CTS LIFE HISTORY

CTS are an endemic species to the lowlands of central California and are listed as threatened under the federal and state Endangered Species Acts. The primary cause of CTS population decline is loss of habitat from development (USFWS 2004). CTS require both terrestrial and aquatic habitats in order to complete its life cycle. Adult salamanders will breed within seasonal ponds and wetlands during the wet season, and during the dry season will move into the surrounding uplands, living underground in fossorial mammalian burrows (Loredo and Van Vuren 1996, Loredo et al. 1996). The CTS larvae develop within aquatic breeding habitat and then move into the adjacent upland habitat as metamorphosed juveniles. Characteristic upland habitat consists of annual grasslands, which are typically grazed by livestock. Upland habitat must also contain mammal burrows or shrink-swell soil cracks that provide refugia, which is used for the majority of their lifecycle (USFWS 2004).

The breeding period for CTS is generally December through February. Females lay eggs to attached vegetation, twigs, debris, or in some cases, rocks submerged in water



(Stebbins and McGinnis 2012). The eggs of CTS hatch in approximately 10 to 14 days. Although the larvae of CTS can overwinter in appropriate habitats, the larval stage typically lasts between 3 and 6 months and is largely dependent on the inundation period of the wetland (Alvarez 2004). Therefore, for the purposes of this report, CTS aquatic habitat is defined as any body of water deeper than 12 inches that ponds, on average, for longer than 10 consecutive weeks. CTS movements have been recorded at distances of up to 1.24 miles between upland habitat and breeding ponds (USFWS 2004). However, overland movements are significantly constrained by urban development and freeways (USFWS 2003).

DEFINITIONS

For the purposes of this report, **CTS aquatic breeding habitat** is defined as any body of water deeper than 12 inches that ponds, on average, for longer than 10 consecutive weeks. CTS habitat types associated with breeding are defined as follows:

1. **Known CTS Breeding Habitats** are aquatic habitats that, during average precipitation years, have sufficient hydrology (depth and duration) for CTS larvae to complete metamorphosis and CTS larvae have been observed.
2. **Potential CTS Breeding Habitats** are aquatic habitats that, during average precipitation years, have sufficient hydrology for CTS larvae to complete metamorphosis, although CTS larvae have not been observed.
3. **Not Potential CTS Breeding Habitats** are aquatic habitats that, during average precipitation years, do not have sufficient hydrology for CTS larvae to complete metamorphosis and CTS larvae have not been observed.

For the purposes of this report, **CTS refugia habitat** is defined as fossorial mammal burrows and soil cracks >1 inch in diameter and deeper than 12 inches.

For the purposes of this report, **CTS dispersal (movement) habitat** is defined as annual grasslands or oak woodlands that are routinely grazed such that movement of a CTS metamorph or adult would not be hindered.

BREEDING CONSTRAINTS

High constraints to CTS breeding are lotic aquatic habitats (e.g., swiftly moving waterways) and habitats that do not pond water deeper than 12 inches for longer than 10 consecutive weeks for CTS larvae to complete metamorphosis, as well as large perennial aquatic habitats that may contain predators (e.g., fish, crayfish, etc.).



Moderate constraints to CTS breeding are aquatic habitats that have sufficient ponding depth and duration but are not surrounded by suitable upland refugia or dispersal (movement) habitat which may preclude CTS from breeding and laying eggs within the pond.

Low constraints to CTS breeding are those disturbances within an aquatic habitat that occur at a low enough frequency that most likely would not preclude the use by CTS, but could still harm or kill individuals.

MOVEMENT CONSTRAINTS

High constraints to CTS movement are barriers in which the CTS cannot pass over, through, or under (e.g., sound walls) or that CTS would most likely perish while trying pass over (e.g., freeways), through (e.g., water waterway with predators), or under them and include: urban residential and commercial development, concrete agriculture canals, perennial waterways, and other waterways with predators.

Moderate constraints to CTS movement are those that would greatly increase the likelihood of mortality from exposure to predators or exposure to desiccation by increasing the length of CTS movement or dispersal time and consist of fallow fields with thick rank vegetation, disked fields with no vegetation cover, rural development, and paved roads.

Low constraints to CTS movement are those that slightly increase the likelihood of mortality such as ephemeral drainages with steep slopes that hinder CTS crossings.

No constraints to CTS movement are those that do not have permanent or significant barriers to movement such as routinely grazed annual grasslands.

REFUGIA CONSTRAINTS

Constraints to CTS refugia habitat are those disturbances in a habitat that reduce the likelihood of use by CTS.

High constraints to CTS refugia habitat are those habitats that do not support fossorial animals and burrows or clay soils with high shrink-swell potential such as urban development, roads, waterbodies, wetlands, or that have disturbances at a frequency that would preclude CTS use such as irrigated agricultural fields and pastures that would flood burrows and cause CTS immergence during inhospitable periods (dry-season).

Moderate constraints to CTS refugia habitat are those that occur in a habitat at a frequency that most likely preclude their use by CTS such as disking on a routinely

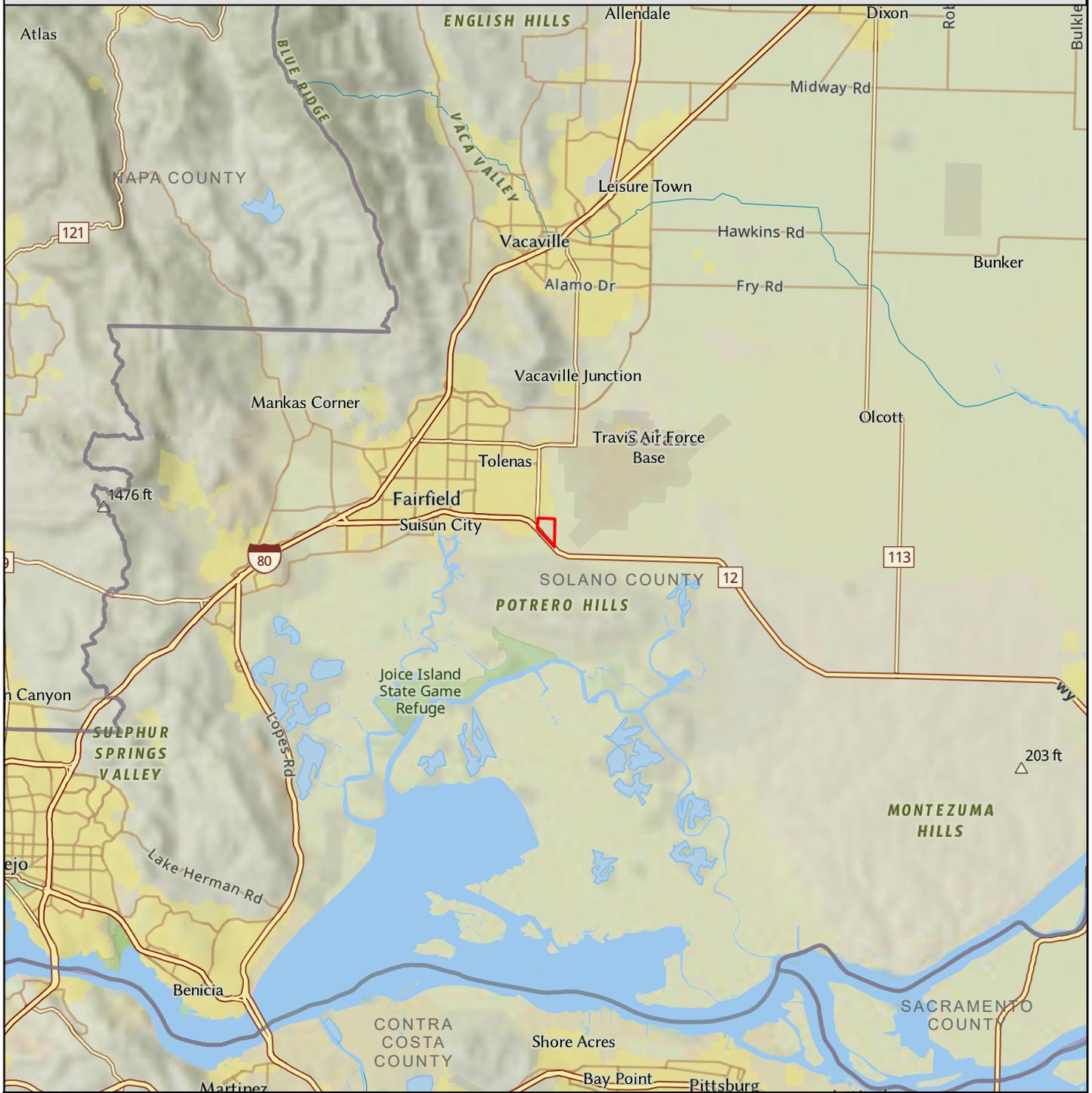


biannual basis which would plug entrances and exits to burrows and increase difficulty for CTS movement.

Low constraints to CTS refugia habitat are those disturbances within a habitat that occur a low enough frequency that mostly likely would not preclude the use by CTS yet individuals could be harmed or killed.

This remainder of this report discusses the methods and results of the CTS habitat assessment at the Suisun Logistics Center.

SUISUN LOGISTICS CENTER PROJECT, SOLANO COUNTY, CALIFORNIA



0 2 4
Miles

N

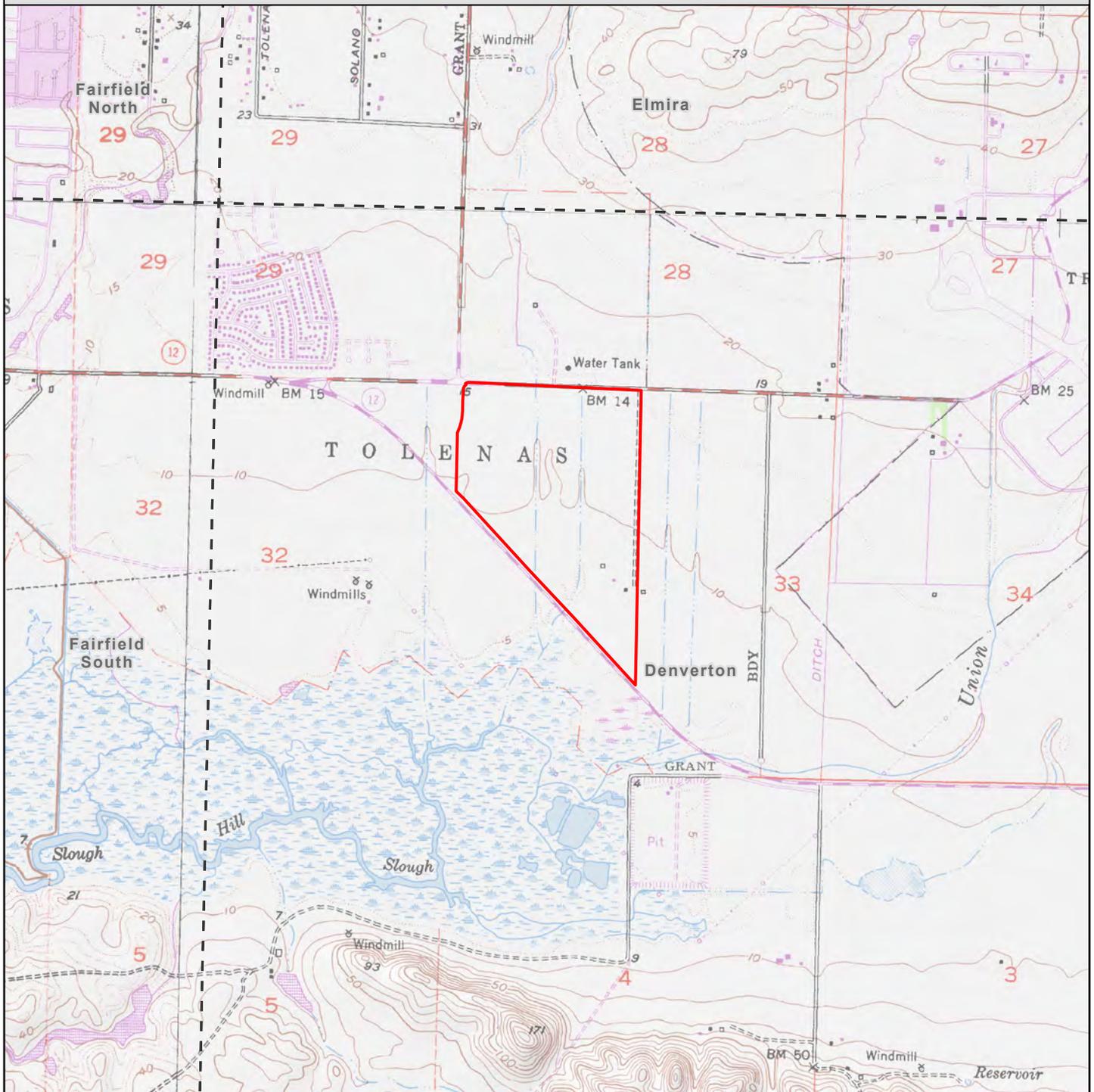
Data Source:
USGS The National Map 2021;
ESRI USA Boundaries;
ESRI National Geographic Style
Basemap

Prepared by:
HELM
BIOLOGICAL CONSULTING
4800 Karlov Ave., Sherridan, CA 95061

Date: 9/8/2022

Figure 1. Project Vicinity

SUISUN LOGISTICS CENTER PROJECT, SOLANO COUNTY, CALIFORNIA

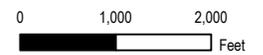


- Project Site (161.31 acres)
- USGS 24k Topo Map Boundaries

The Project Site is located within the Denverton, CA USGS 7.5-minute quadrangle map.

The site occurs within an unsectioned portion of Township 5 North and Range 1 West, Mt. Diablo Base & Meridian.

Center Coordinates (NAD83) for Study Area:
Latitude 38.239186, Longitude -121.983123



Data Source:
USGS The National Map 2021;
ESRI USA Boundaries;
Public Land Survey System

Prepared by:



Date: 9/8/2022

Figure 2. Project Location on USGS Topographic Map



METHODS

The habitat assessment for CTS followed USFWS and California Department of Fish and Wildlife's (CDFW, formally Department of Fish and Game) *Interim Guidance on Conducting Site Assessments and Field Surveys for Determining Presence or a Negative Finding of the California Tiger Salamander (October 2003)* (hereafter "CTS Protocol"), and consisted of a pre-field assessment and a field assessment described below.

PRE-FIELD ASSESSMENT

Prior to conducting field habitat assessments, information concerning occurrences for CTS within 3.1 miles (5 km) and 1.24 miles (2 km), respectively, radius of the Project (hereafter "Study Area") was noted using information from the CDFW California Natural Diversity Data Base (CNDDDB) and Sacramento USFWS and CDFW offices.

In addition, potential breeding habitats for CTS were investigated within a 1.24-mile (2 km) (per the CTS Protocol). This investigation was accomplished by viewing signatures of emergent vegetation, open water habitat, and drainages from aerial photographs (Google Earth™) for habitat parameters specific to the species.

In order to determine if an aquatic feature could provide suitable CTS breeding habitat, all the following observable criteria had to be met:

- Ponding during CTS breeding season (December – February)
- Sufficient hydrologic period (Continuous inundation for >10 consecutive weeks)
- Hydrologic suitability (12 inches minimum ponding depth)

Ponding during the breeding season had to be observed in aerial photographs in order to be initially considered potential suitable breeding habitat for CTS. Aquatic features not meeting this criterion were noted, but not investigated further. Next, the aquatic feature had to have a sufficient hydroperiod to support CTS larval development (at least 10 weeks) observed through time-lapse images over multiple years. Perennial water features that remained inundated over multiple years were also considered potential habitat, because the presence/absence of CTS predators could not be determined. Only features with lentic hydrology were considered suitable for CTS breeding habitat. Large features (i.e., reservoirs and lakes) were not considered suitable for CTS due to the high likelihood of containing known predators.



FIELD ASSESSMENTS

Habitat assessments were conducted in the field by HBC ecologists Mr. Zachary Einweck and Ms. Kathleen Colima Aguirre on August 21 and 22, 2023. All accessible and/or observable areas identified in the pre-field investigation as possible breeding habitat for CTS were investigated in the field both at the Project (onsite) and the Study Area (offsite surrounding the Project) as described below.

OFFSITE. The off-site field assessment entailed driving on public (and some private) roads for access to possible CTS breeding habitat sites. Private roads and properties posted with “Private Property”, “No Trespassing,” or “No Public Access” signs were avoided. These habitats were viewed with binoculars where possible.

ONSITE. Onsite field assessments consisted of walking the entire Project and observing possible CTS breeding, refugia, and dispersal habitat. All onsite aquatic features were evaluated for potential CTS breeding habitat suitability based on the metrics described in the pre-field assessment section. In the field, additional aquatic feature indicators for suitable CTS habitat included the presence of hydrophytic vegetation indicative of long ponding (e.g., common spikerush [*Eleocharis macrostachya*], cattails [*Typha ssp.*]), seasonal durations, feature bathymetry (basin shape), and ponding duration. Upland vegetation communities and land uses were noted, as well as local topography and drainage patterns. Specifics concerning the field habitat assessments for CTS are described below.

Upland habitats onsite and offsite were assessed for CTS upland refugia suitability based on the presence of fossorial mammalian burrows, soil cracks, and suitable vegetation cover (i.e., annual grasslands and oak woodlands).



RESULTS

PRE-FIELD ASSESSMENT

A review of the CNDDDB revealed nine known occurrences of CTS within 3.1 miles (5 km) of the Project (Appendix A). All of these known CTS occurrences are outside of the 1.24-mile (2 km) Study Area. A review of aerial photography within the Study Area revealed 107 possible aquatic breeding habitats for CTS prior to conducting the Field Assessments described below (Appendix A and Appendix B).

ON-SITE FIELD ASSESSMENT

BREEDING CONSTRAINTS. No potential CTS breeding habitats occur onsite. One seasonal wetland (SW-31) present in the Project area matched proper hydrologic conditions for CTS breeding but was not considered suitable aquatic CTS breeding habitat due to the presence of known predators (e.g., red swamp crawfish [*Procambarus clarkia*], and western mosquitofish [*Gambusia affinis*]) found during 2023 large branchiopod wet-season surveys conducted by HBC (2023) which pose as a high constraint to breeding (Appendix A). All other aquatic features onsite did not meet the proper hydrologic conditions of a 12-inch ponding depth minimum and/or ponding of at least 10 consecutive weeks to be considered potential CTS breeding habitat.

DISPERSAL CONSTRAINTS. Although the Project is flat, and the upland annual grassland is seasonal grazed by cattle, there are several high constraints to CTS dispersal onsite. The marsh habitats occurring along the southern border would be a major constraint to CTS movement since they support perennial populations of predators. Additionally, there are two ditches onsite that would constrain the Project use by CTS. These ditches are steep-sided; support CTS predators; and bisect the Project in a north-south direction, creating three separate fields: west, middle and east (Figure 3). Although, there is a passage across each ditch (located roughly 2/3 their lengths to the south), because these passages are quite narrow (10 -12 foot width) it is possible that CTS could use them, but not probable (Figure 3).

REFUGIA CONSTRAINTS. No refugia habitat for CTS occurs onsite. All of the uplands within the Project are not considered potential CTS refugia habitat because they lacked fossorial mammal burrows or soil cracks that were at least 12 inches deep (Figure 4). In conclusion, the Project is highly constrained by lack of CTS breeding habitat, and refugia habitat, and habitats (Ditch and Marsh) that support predators. Only the eastern field has any real access to dispersing CTS.



OFF-SITE FIELD ASSESSMENT

BREEDING CONSTRAINTS. A total of 107 features were surveyed for possible CTS breeding habitat off-site (Appendix B). Of those 107 features, 63 features were considered not suitable CTS habitat after observations of unsuitable habitat conditions (e.g., insufficient hydrology and/or evidence of predators) (Appendix B). Twenty-eight features were considered to have potential breeding habitat based on aerial imagery, but were inaccessible (e.g., private property, “No Trespassing” signage) and were not observable with binoculars due to barriers (e.g., urban areas, private property, Highway 12, and lotic waterways) and could not be field verified (Appendix B). The remaining 16 features were considered potential breeding habitat for CTS based on observations of suitable ponding depth and duration from aerial photograph interpretation and field verification (Appendix B).

The far majority of the 44 features (16 verified and 28 not field verified) that were considered potential breeding habitat for CTS occur south of Highway 12 which is a major constraint to movement for CTS (see Dispersal Constraints below) (Figure 3 and Appendix A). Similarly, most of the possible CTS breeding occurring north of Highway 12 are associated with waterways (e.g., Union Creek) that are perennial and or support CTS predators and therefore were not considered CTS breeding habitats. Only two areas located north of Highway 12 were considered to have potential breeding habitats based on the pre-field survey aerial photograph interpretation. This includes an area referred to as “Mitigation Area” and P-90 described below (Appendix A).

Eight capsule-shaped human constructed ponds (P-61, P-61A through P-61F, and P-92), presumably built as mitigation for the adjacent subdivision, occurs in the very northern portion of the Study Area. This “Mitigation Area” occurs in a low topographic depression that captures water from the upslope swale and routes it through two human constructed ditches which meandered south until they rejoin and terminate. Two smaller natural swales empty in the eastern of the two ditches. Additionally, the park occurring to the west of the Mitigation Area, drains into the southern terminus of the ditch. Most of the constructed ponds are overgrown with riparian trees, shrubs, and blackberry vines. In addition, the herbaceous growth that surrounds these ponds is tall, thick, dense with a lot of thatch, since it is not managed (e.g., grazed, burned, mowed, or disked) for vegetation reduction. Thus, although some of the occurring ponds may meet the specific criteria as potential breeding habitats, access for CTS is constrained by the vegetation present. The Mitigation Area is fenced with ‘No Trespassing’ signage so the potential CTS breeding habitats present could not be field verified.

P-90, located north of the Irving H. Lambrecht Sports Complex, is a small seasonal wetland that is not connected to any waterways (Appendix A). While P-90 appeared to



have a sufficient hydrologic period based on aerial imagery, access was restricted by ‘No Trespassing’ signage and it was not visible with binoculars thus, could not be field verified.

DISPERSAL CONSTRAINTS. The Project is relatively isolated, being surrounded by high and moderate constrains to CTS movements (e.g. urban development, roads, as well as ditches and other waterways supporting CTS predators). Highway 12 which occurs along its southern border is a major high constraint to CTS dispersal to and from the Project. State Highway 12 is a very busy freeway with vehicular activity 24 hours a day 365 days a year (Figure 3).

There are two areas that CTS could possibly access the Project via culverts under State Highway 12. These entrances occur through the main drainage ditches that bisect the middle of the Project (Figure 3 and Appendix A). However, these entrances would require the CTS to travel through Suisun Marsh and Union Creek which have fast flows during the rainy season and support perennial populations of predatory fish (e.g., three-spined stickle back [*Gasterosteus aculeatus*] and Western mosquitofish [*Gambusia affinis*]).

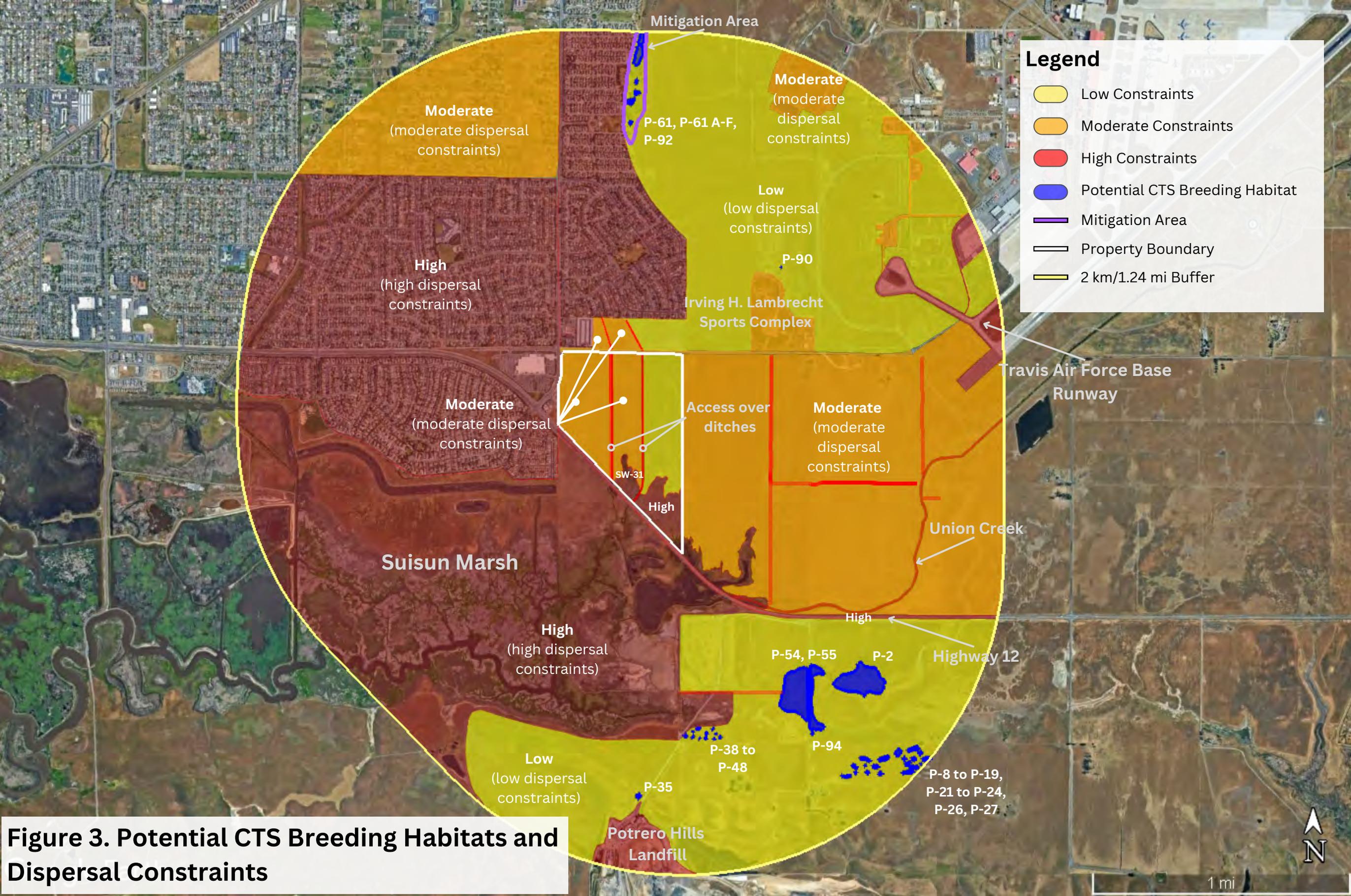
The Study Area is further constrained by the densely populated urban housing areas (e.g., Peterson Ranch, Montebello Vista and Ivy Crossing), located directly west and north of the Project. These areas do not provide habitat suitable for CTS dispersal, as well as breeding and refugia. Only the very northwestern portion of the Study area has lower density houses with some natural lands (5-acre lots, Moderate Constraint to movement) (Figure 3).

The northeastern corner of the Study Area is considered a low constraint to CTS movement since the annual grasslands are managed, and there are no perennial or semi-perennial waterways with CTS predators, and few roads that are not well traveled (Figure 3). The area directly east of the Study Area is considered a moderate constraint to CTS dispersal since it has taller herbaceous vegetation than that in the northeast corner and several ditches and waterways that are perennial or semi-perennial that support CTS predators (Figure 3).

REFUGIA CONSTRAINTS. The northwest corner of the Study Area consists of urban development, most of which is high density, with no CTS refugia (Figure 4). Possible CTS refugia habitats located north of State Highway 12 had similar conditions to that of the Project (see On-Site Field Assessment above). There was no evidence of fossorial mammal burrows nor were burrowing animals observed. Rodenticide efforts have and are currently enforced at the adjacent Travis Airforce Base to minimize potential damage to runways, roads and other infrastructures from burrowing mammals, especially California ground squirrels (*Otospermophilus beecheyi*). In contrast, the off-site areas located south of State Highway 12, have high densities of California ground squirrels and burrows,



demonstrating suitable CTS refugia (Figure 4).



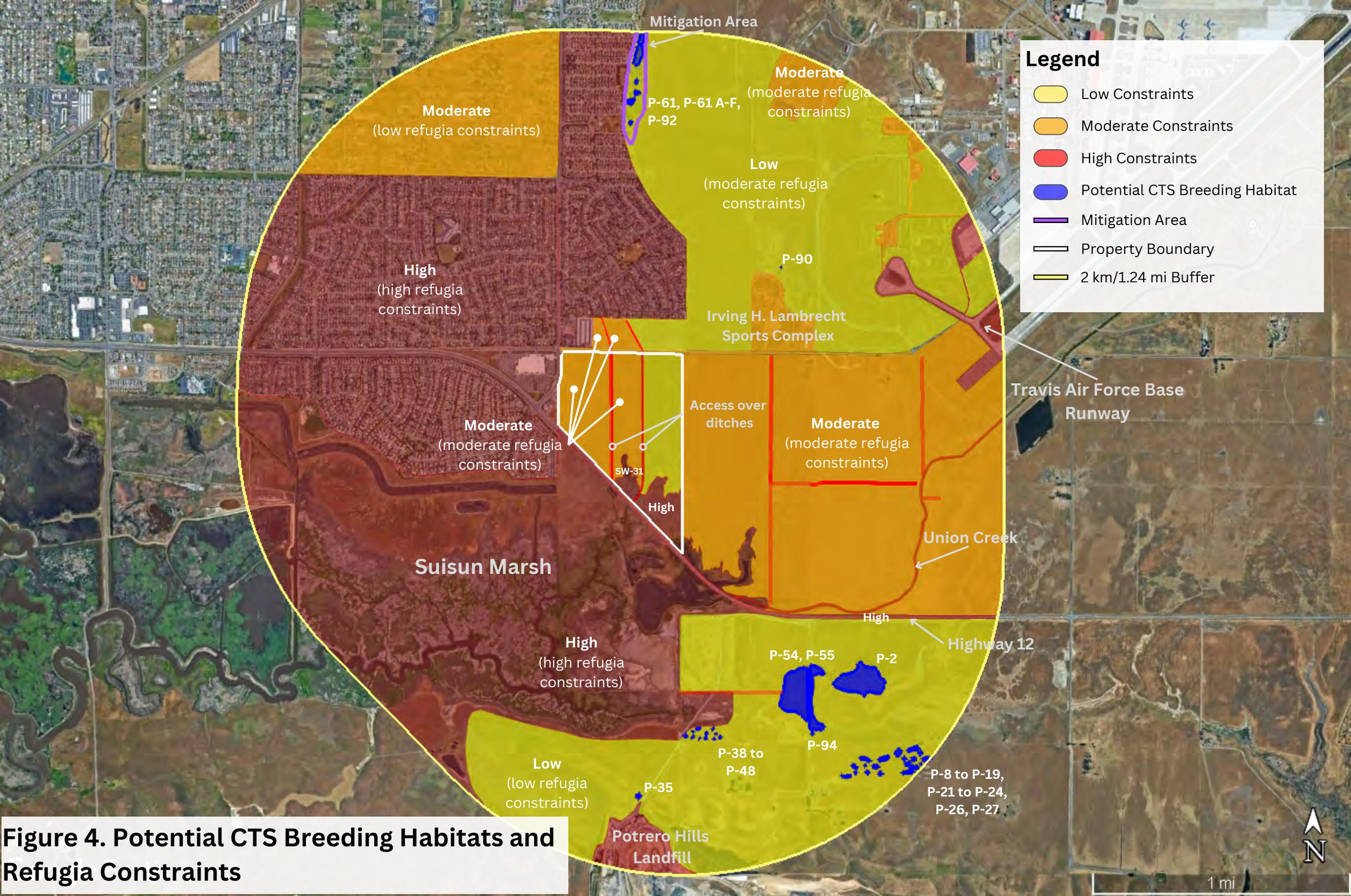


Figure 4. Potential CTS Breeding Habitats and Refugia Constraints



CONCLUSIONS

Although potential breeding habitat and dispersal habitats occurs within the vicinity of the Project, the likelihood of a CTS occurring on the Project is very low. The Project does not support CTS breeding habitat and the upland habitat occurring onsite is of low quality due to limited burrows, lack of California ground squirrels, and decades of incompatible farming practices (e.g., land leveling, irrigation, disking, etc.). In addition, dispersal within the Project is further restricted by the two drainage ditches that bisect the Project in north-south orientated which support CTS predators. There is only one spot along the two ditches that CTS could pass over them occurring roughly $\frac{3}{4}$ of the length near the southern portion of the Project (Figure 3). However, this passage is narrow and therefore not probable to be used by CTS.

Potential dispersal to the Project by CTS is limited as well, due to high constraints of vehicle use along Highway 12 that bounds the southern portion of the Project and the huge urban housing developments in the west and northwest portion of the Study Area restricting entrance from these directions. The northeast corner of the Study Area is, or originally belonged to, Travis Airforce Base which has practiced numerous years of rodenticide and therefore fossorial mammals, as well as their burrows, are extremely limited in the vicinity. The southwest corner of the Study Area consists mostly of tidal marsh lands which support CTS predators. The area to the east of the Project consists of tall rank vegetation with numerous ditches and waterways that support CTS predators thus severely limited CTS access to the Project from the east.

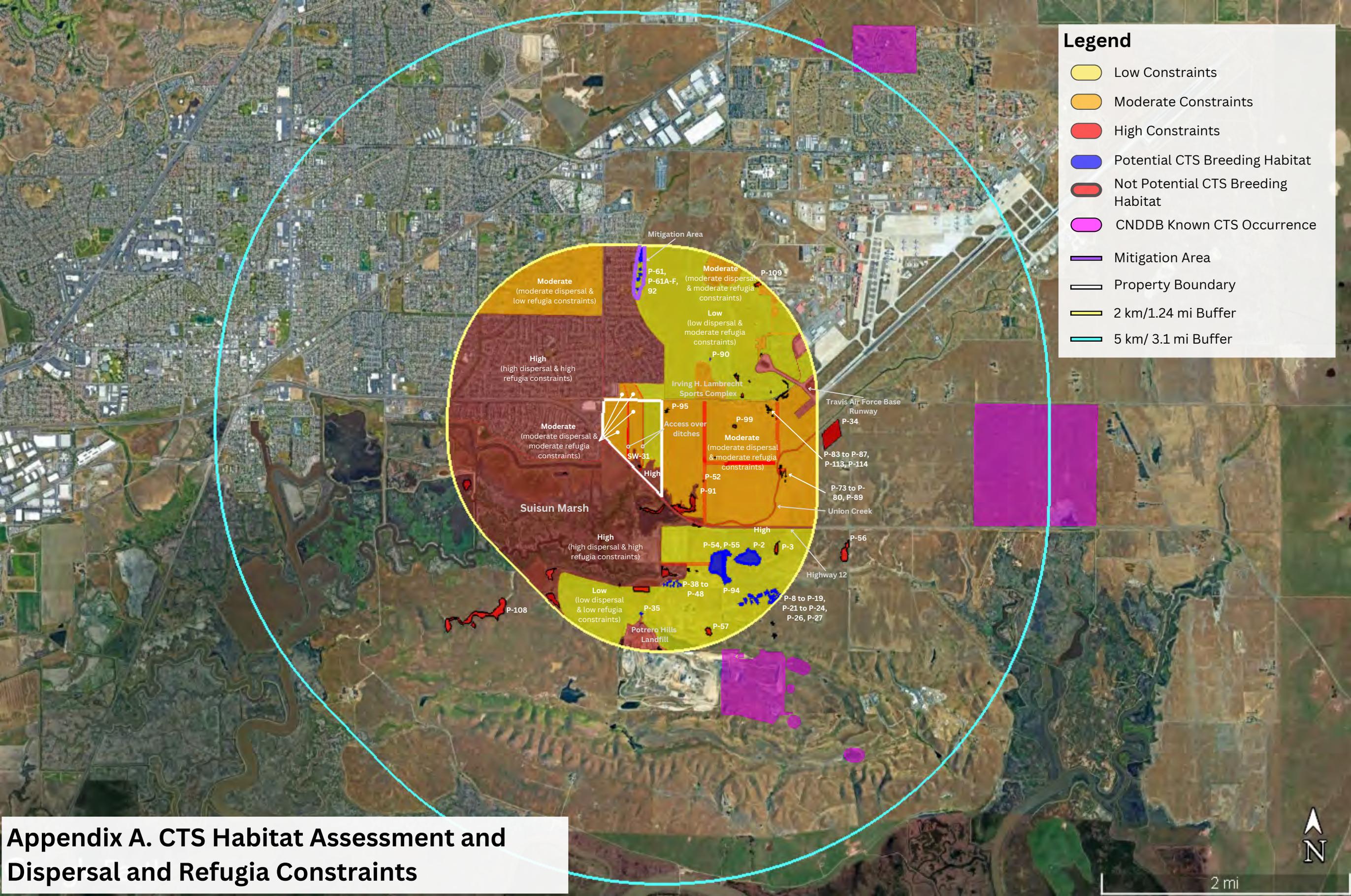


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APPENDIX A.
CTS HABITAT ASSESSMENT



Appendix A. CTS Habitat Assessment and Dispersal and Refugia Constraints

2 mi





APPENDIX B.
RESULTS OF CTS HABITAT ASSESSMENT

Appendix B. Results of Habitat Assessment for Potential California Tiger Salamander Breeding Habitats

Polygon #	Habitat Type	Depth		Dominant Vegetation	Suitable Habitat	Field		Comments
		Max	Min			Yes	No	
1	Marsh				No		X	A part of the brackish marsh
2	Seasonal wetland	20 in		alkali heath (<i>Frankenia salina</i>)	Yes	X		Viewable with binoculars
3	Seasonal wetland				No		X	Not viewable with binocs
6	Marsh				No		X	A part of the brackish marsh
7	Seasonal Pond	> 6 ft		Cattails (<i>Typha sp.</i>), cocklebur (<i>Xanthium sp.</i>), willow (<i>Salix sp.</i>), cottonwood (<i>Populus sp.</i>)	No	X		Crayfish exoskeletons observed, crayfish burrows, bird activity observed
8	Seasonal wetland				Yes		X	Inaccessible, private fencing, ground squirrels
9	Seasonal wetland				Yes		X	Inaccessible, private fencing, ground squirrels
10	Seasonal wetland				Yes		X	Inaccessible, private fencing, ground squirrels
11	Seasonal wetland				Yes		X	Inaccessible, private fencing, ground squirrels
12	Seasonal wetland				Yes		X	Inaccessible, private fencing, ground squirrels
13	Seasonal wetland				Yes		X	Inaccessible, private fencing, ground squirrels
14	Seasonal wetland				Yes		X	Inaccessible, private fencing, ground squirrels
15	Seasonal wetland				Yes		X	Inaccessible, private fencing, ground squirrels
16	Seasonal wetland				Yes		X	Inaccessible, private fencing, ground squirrels
17	Seasonal wetland				Yes		X	Inaccessible, private fencing, ground squirrels
18	Seasonal wetland				Yes		X	Inaccessible, private fencing, ground squirrels
19	Seasonal wetland				Yes		X	Inaccessible, private fencing, ground squirrels
21	Seasonal wetland				Yes		X	Inaccessible, private fencing, ground squirrels
22	Seasonal wetland				Yes		X	Inaccessible, private fencing, ground squirrels
24	Seasonal wetland				Yes		X	Inaccessible, private fencing, ground squirrels
26	Seasonal wetland				Yes		X	Inaccessible, private fencing, ground squirrels
27	Seasonal wetland				Yes		X	Inaccessible, private fencing, ground squirrels
35	Perennial stock pond	9.5 ft		Bristly oxtongue (<i>Helminthotheca echioides</i>), rush (<i>Juncus sp.</i>), cattails (<i>Typha sp.</i>)	Yes	X		Waterboatman, raccoon paw prints near edge of water
37	Marsh			perennial peppergrass (<i>Lepidium latifolium</i>), salt grass (<i>Distichlis sp.</i>), rush (<i>Juncus sp.</i>)	No	X		A part of the brackish marsh. Overflow basin for Hill Slough
38	seasonal wetland	10 in		perennial peppergrass (<i>Lepidium latifolium</i>), Italian ryegrass (<i>Festuca perennis</i>), rabbit's foot grass (<i>Polypogon monspeliensis</i>)	Yes	X		

39	Seasonal wetland	2 ft	white sweetclover (<i>Melilotus albus</i>), curley dock (<i>Rumex crispus</i>), Italian ryegrass (<i>Festuca perennis</i>)	Yes	X		
40	Seasonal wetland	12 in	curley dock (<i>Rumex crispus</i>), perennial peppergrass (<i>Lepidium latifolium</i>), cocklebur (<i>Xanthium sp.</i>), prickly lettuce (<i>Lactuca serriola</i>)	Yes	X		
41	Seasonal wetland	2.5 ft	bird's-foot trefoil (<i>Lotus corniculatus</i>), stink weed (<i>Thlaspi arvense</i>), field bindweed (<i>Convolvulus arvensis</i>), curly dock (<i>Rumex crispus</i>), bristly oxtongue (<i>Helminthotheca echioides</i>)	Yes	X		
42	Seasonal wetland	2.5 ft	bird's-foot trefoil (<i>Lotus corniculatus</i>), white sweetclover (<i>Melilotus albus</i>), cocklebur (<i>Xanthium sp.</i>), bristly oxtongue (<i>Helminthotheca echioides</i>)	Yes	X		
43	Seasonal wetland	10 in	Tarweed (<i>Madia sp.</i>), curley dock (<i>Rumex crispus</i>), birds-foot trefoil (<i>Lotus corniculatus</i>)	Yes	X		
44	Seasonal wetland	2 ft	Gumweed (<i>Grindelia sp.</i>), rabbit's foot grass (<i>polypogon monspeliensis</i>), bird's-foot trefoil (<i>Lotus corniculatus</i>), stink weed (<i>Thlaspi arvense</i>)	Yes	X		
45	Seasonal wetland	14.5 in	bird's-foot trefoil (<i>Lotus corniculatus</i>), bristly oxtongue (<i>Helminthotheca echioides</i>), fitch's tarweed (<i>Centromadia fitchii</i>)	Yes	X		
46	Seasonal wetland	12 in	Prickly lettuce (<i>Lactuca serriola</i>), bird's-foot trefoil (<i>Lotus corniculatus</i>), coyote thistle (<i>Eryngium vaseyi</i>), soft brome (<i>Bromus hordeaceus</i>), curley dock (<i>Rumex crispus</i>), stink weed (<i>Thlaspi arvense</i>), Italian ryegrass (<i>Festuca perennis</i>)	Yes	X		
47	Seasonal wetland	15.5 in	spike rush (<i>Eleocharis geniculata</i>), curly dock (<i>Rumex crispus</i>), woolly marbles (<i>Psilocarphus brevissimus</i>), Italian ryegrass (<i>Festuca perennis</i>), soft brome (<i>Bromus hordeaceus</i>)	Yes	X		
48	Seasonal wetland	10 in	Fitch's tarweed (<i>Centromadia fitchii</i>), spike rush (<i>Eleocharis palustris</i>), field bindweed (<i>Convolvulus arvensis</i>), bird's-foot trefoil (<i>Lotus corniculatus</i>), hyssop loosestrife (<i>Lythrum hyssopifolium</i>)	Yes	X		

49	Constructed pond				No	X	No access, 'no trespassing' signage. In 2020 appears to hold water but land owners might of filled it in.
50	Constructed seasonal wetland				No	X	Inaccessible, fenced off
51	seasonal wetland				Yes	X	Inaccessible, private fencing, ground squirrels present
53*	Seasonal-wetland	1.5 ft			No	X	Only feature on Project site (SW-31).
54	Seasonal wetland	1.5 ft		Alkali heath (<i>Frankenia salina</i>)	Yes	X	Viewable with binoculars
55	Seasonal wetland	20 in		Alkali heath (<i>Frankenia salina</i>)	Yes	X	Viewable with binoculars
56	Marsh				No	X	A part of the brackish marsh
57	stock pond				No	X	Inaccessible, cannot see with bins
58	Seasonal wetland	2 ft		Coyote thistle (<i>Eryngium vaseyi</i>), cocklebur (<i>Xanthium sp.</i>)	No	X	Birds (predators)
60	Saturated soil				No	X	Inaccessible, fenced off
61	Constructed seasonal wetland				yes	X	Mitigation Area, no access, 'no trespassing' signage
61A	Constructed seasonal wetland				Yes	X	Mitigation Area, no access, 'no trespassing' signage
61B	Constructed seasonal wetland				Yes	X	Mitigation Area, no access, 'no trespassing' signage
61C	Constructed seasonal wetland				Yes	X	Mitigation Area, no access, 'no trespassing' signage
61D	Constructed seasonal wetland				Yes	X	Mitigation Area, no access, 'no trespassing' signage
61E	Constructed seasonal wetland				Yes	X	Mitigation Area, no access, 'no trespassing' signage
61F	Constructed seasonal wetland				Yes	X	Mitigation Area, no access, 'no trespassing' signage
62	Saturated soil				no	X	Inaccessible, TAFB
63	Saturated soil				no	X	Inaccessible, TAFB
64	seasonal wetland				no	X	Inaccessible, TAFB
65	seasonal wetland				no	X	Inaccessible, TAFB
66	Drainage ditch				no	X	Inaccessible, TAFB
67	Drainage ditch				no	X	Inaccessible, TAFB
68	seasonal pond				no	X	Inaccessible; most likley overflow from drainage ditch
69	Drainage ditch				no	X	Inaccessible
70	Seasonal pond (most likley overflow from drainage ditch)				no	X	Inaccessible
71	Seasonal wetland				no	X	Inaccessible, TAFB
72	Drainage ditch				no	X	Inaccessible, TAFB
73	Seasonal pond				no	X	Inaccessible, TAFB
74	Seasonal pond				no	X	Inaccessible, TAFB
75	Seasonal pond				no	X	Inaccessible, TAFB
76	Seasonal pond				no	X	Inaccessible, TAFB
77	Seasonal wetland				no	X	Inaccessible, TAFB
78	Seasonal wetland				no	X	Inaccessible, TAFB
79	Seasonal pond				no	X	Inaccessible, TAFB
80	Seasonal pond				no	X	Inaccessible, TAFB
81	Drainage ditch	2 ft		Italian ryegrass (<i>Festuca perennis</i>), curly dock (<i>Rumex crispus</i>)	No	X	
82	Saturated soil				no	X	Inaccessible
83	Seasonal wetland				no	X	Inaccessible, TAFB
84	Seasonal wetland				no	X	Inaccessible, TAFB
85	Seasonal wetland				no	X	Inaccessible, TAFB

86	Seasonal wetland				no		X	Inaccessible, TAFB
87	Seasonal wetland				no		X	Inaccessible, TAFB
88	Drainage ditch				no		X	Inaccessible, TAFB
89	Seasonal pond				no		X	Inaccessible, TAFB
90	Seasonal pond				Yes		X	No access, TAFB
91	Seasonal marsh			Salt grass (<i>Distichlis sp.</i>), rush (<i>Juncus sp.</i>), cocklebur (<i>Xanthium sp.</i>)	no	X		
92	Constructed seasonal wetland				Yes		X	Mitigation Area, no access, 'no trespassing' signage
93	Swale				no		X	No access, 'no trespassing' signage
94	Seasonal wetland	24 in			Yes	X		Viewable with binoculars
95	Seasonal wetland	7 in		Coyote thistle (<i>Eryngium vaseyi</i>), turkey mullein (<i>Croton setiger</i>), tarweed (<i>Madia sp.</i>)	No	X		Located near trough/stable. Heavily cow punched.
96	Drainage ditch	4 ft		Cattails (<i>Typha sp.</i>), Sacramento mesamint (<i>Popogyne zizyphoroides</i>), rush (<i>Juncus sp.</i>)	No	X		Birds, north of project site
97	Drainage ditch	> 4 ft		Cattails (<i>Typha sp.</i>), Sacramento mesamint (<i>Popogyne zizyphoroides</i>), rush (<i>Juncus sp.</i>)	No	X		Mammal scat on bank, wild turkey; north of Project
99	Saturated soil				No		X	Inaccessible
100	Saturated soil				No		X	A part of the brackish marsh
101	Saturated soil				No		X	No access, 'no trespassing' signage
102	Saturated soil				No		X	No access, 'no trespassing' signage
103	Seasonal wetland				No		X	Inaccessible, TAFB
104	Seasonal wetland				No		X	Inaccessible, TAFB
105	Drainage ditch				No		X	No data
106	Ditch	4.5 ft		Cocklebur (<i>Xanthium sp.</i>), rabbit's foot grass (<i>Polypogon monspeliensis</i>), peppergrass (<i>Lepidium latifolium</i>), Italian ryegrass (<i>Festuca perennis</i>)	No	X		
109	Seasonal wetland				No		X	Inaccessible, TAFB
110	Natural drainage "ditch"				No		X	Inaccessible, TAFB; drains into P-63
111	Drainage ditch				No		X	Inaccessible, TAFB
112	Drainage ditch				No		X	
113	Seasonal pond				No		X	Inaccessible, TAFB
114	Seasonal wetland				No		X	Inaccessible, TAFB
120	Stock Pond				No			Connected to Hill Slough and Union Creek; Mitigation Area
121	Perennial pond				No		X	Inaccessible, cannot see with binoculars; Mitigation Area
122	Drainage ditch				No		X	Inaccessible, cannot see with binoculars; Mitigation Area
123	Drainage ditch				No		X	Inaccessible, cannot see with binoculars; Mitigation Area
124	Swale				No		X	Mitigation Area



**APPENDIX C.
REPRESENTATIVE PHOTOS**



Photograph of P-97 taken by Zachary Einweck on August 21, 2023



Photograph of P-97 taken by Zachary Einweck on August 21, 2023



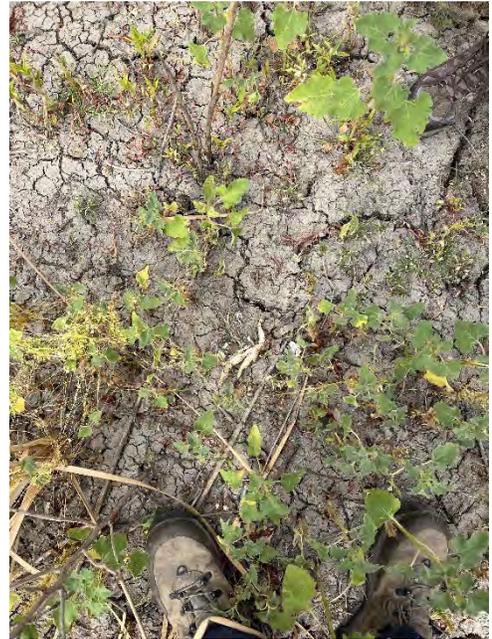
Photograph of P-96 taken by Zachary Einweck on August 21, 2023



Photograph of "No Trespassing" sign restricting access to P-33 and P-49 taken by Zachary Einweck on August 21, 2023



Photograph of “No Trespassing” sign restricting access to P-61, P-92 and P-93 taken by Zachary Einweck on August 21,



Photograph of crayfish carapaces (shells) in P-7 taken by Zachary Einweck on August 21, 2023



Photograph of crayfish burrows in P-7 taken by Zachary Einweck on August 21, 2023



Photograph of P-7 taken by Zachary Einweck on August 21, 2023



Photograph of P-95 taken by Zachary Einweck on August 21, 2023



Photograph of P-81 taken by Zachary Einweck on August 21, 2023



Photograph of P-58 taken by Zachary Einweck on August 21, 2023



Photograph of P-52 taken by Zachary Einweck on August 21, 2023



Photograph of P-106 taken by Zachary Einweck on August 21, 2023



Photograph of P-40 taken by Zachary Einweck on August 21, 2023



Photograph of P-39 taken by Zachary Einweck on August 21, 2023



Photograph of P-39 taken by Zachary Einweck on August 21, 2023



Photograph of P-43 taken by Zachary Einweck on August 21, 2023



Photograph of P-42 taken by Zachary Einweck on August 21, 2023



Photograph of P-48 taken by Zachary Einweck on August 21, 2023



Photograph of P-44 taken by Zachary Einweck on August 21, 2023



Photograph of P-47 taken by Zachary Einweck on August 21, 2023



Photograph of P-46 taken by Zachary Einweck on August 21, 2023



Photograph of P-45 taken by Zachary Einweck on August 21, 2023



Photograph of P-41 taken by Zachary Einweck on August 21, 2023



Photograph of P-35 taken by Zachary Einweck on August 21, 2023



Photograph of P-55 taken by Zachary Einweck on August 22, 2023



Photograph of P-54 taken by Zachary Einweck on August 22, 2023



Photograph of P-94 taken by Zachary Einweck on August 22, 2023



Photograph of "No Trespassing" sign restricting entrance of P-8 through P-27 taken by Zachary Einweck on August 22,

C.7 - Protocol Level Nesting Swainson's Hawk Survey Report

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May 24, 2023

Huffman-Broadway Group, Inc.
523 4th Street, Suite 224
San Rafael, California 94901-3358

Attention: Mr. Robert F. Perrera

**RE: Protocol Level Nesting Swainson's Hawk Survey Report
Suisun Logistics Center Project
Suisun City, Solano County, California**

Dear Mr. Perrera:

I. INTRODUCTION

This letter-report has been prepared to present the results of Monk & Associates' (M&A) protocol level nesting Swainson's Hawk (*Buteo swainsoni*) (SWHA) surveys conducted on and around the proposed Suisun Logistics Center project site (herein referred to as the "project site") in Suisun City, California (Figures 1 through 3). The surveys were conducted in accordance with California Department of Fish and Wildlife (CDFW)'s *Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley*, which identifies different survey windows throughout the pre-nesting and nesting season (ranging from January 1 through July 30/post-fledging) that have different survey methodologies and requirements. The CDFW's survey methodology requires surveys in a 0.5-mile radius around a project site to detect SWHA nesting in the vicinity; however, to get a broader view of SWHA nesting activity in the region, M&A conducted surveys in a five mile radius around the project site (Figure 4).

Surveys were conducted on March 16, 2023 (Survey Period I), March 22, 31 and April 3, 2023 (Survey Period II), and on April 11, 17, and 19 (Survey Period III). ***No active Swainson's Hawk nests or signs of nesting behavior were observed within the five mile study area during these surveys.*** Below, we discuss our field survey methods, results, and conclusions. We also provide the SWHA's legal status and habitat requirements.

2. PROJECT SITE SETTING AND DESCRIPTION

The 173.17-acre project site is located on the south side of Petersen Road, just east of Lawler Ranch Parkway, and north of California Highway 12 (Hwy 12), adjacent to Suisun City in an unincorporated portion of Solano County, California (Figures 1 and 2). The surrounding area includes commercial and residential developments to the west, north, and northwest, undeveloped land to the east, undeveloped marsh and grassland across Hwy 12 to the south, with cultivated and fallow agricultural land to the east. Travis Air Force Base (TAFB) is less than a mile northeast of the project site. In 2021, a new gas station was constructed immediately west of the project site at the intersection of Hwy 12 and Lawler Ranch Parkway which is along the project site's western flank.

Project design has not been finalized. Preliminary design proposes the construction of six one-story industrial buildings ranging in size from 145,397 to 644,782 square feet, loading docks, parking, access driveways, and landscaping.

Page 2

The project site is undeveloped and generally consists of cultivated agricultural fields and non-native annual grassland with scattered seasonal wetlands in the northern portion, and alkali meadow, seasonal wetlands, and coastal brackish marsh in approximately the southern third of the site. The project site is nearly flat with a gentle north-to-south slope with elevation ranging from approximately 6 to 20 feet above sea level. There are no trees on the project site.

3. LEGAL PROTECTION FOR SWAINSON'S HAWK

3.1 California Endangered Species Act

The Swainson's Hawk is a state-listed threatened species afforded protection pursuant to the California Endangered Species Act, Title 14, California Code of Regulations. Additionally, pursuant to CEQA, this hawk would be considered "rare" and impacts to its nest sites would be regarded as significant. Impacts to SWHA foraging habitat can also be regarded as significant pursuant to the CEQA based upon guidelines provided by the CDFW for this raptor species.

3.2 California Fish and Game Code § 3503, 3503.5, 3511, and 3513

California Fish and Game Code §§3503, 3503.5, 3511, and 3513 prohibit the "take, possession, or destruction of birds, their nests or eggs." Disturbance that causes nest abandonment and/or loss of reproductive effort (killing or abandonment of eggs or young) is considered "take."

3.3 Federal Migratory Bird Treaty Act

The Migratory Bird Treaty Act of 1918 (16 U.S.C. §§ 703-712, July 3, 1918, as amended 1936, 1960, 1968, 1969, 1974, 1978, 1986 and 1989) makes it unlawful to "take" (kill, harm, harass, shoot, etc.) any migratory bird listed in Title 50 of the Code of Federal Regulations, Section 10.13, including their nests, eggs, or young. Migratory birds include geese, ducks, shorebirds, raptors, songbirds, wading birds, seabirds, and passerine birds (such as warblers, flycatchers, swallows, etc.).

4. HABITAT REQUIREMENTS

The Swainson's hawk is generally a summer visitor to California. In the fall months, most Swainson's hawks migrate to South America before returning to the United States to breed once again in the late spring. There is a small population of Swainson's hawks that remain residents in California year-round. The nesting population of Swainson's hawks in California was reduced considerably over historical nesting populations at the time it was afforded protections pursuant to the California Endangered Species Act in 1984. Since that time, the nesting population of Swainson's hawk has significantly recovered in California, as have other raptor species that were previously protected both as State and Federal listed species. Both the peregrine falcon (*Falco peregrinus* ssp. *anatum*) and the bald eagle (*Haliaeetus leucocephalus*) were similarly listed species under both the California and Federal Endangered Species Acts, but both have been delisted owing to population recovery.

The Swainson's hawk inhabits open to semi-open areas at low to middle elevations in valleys, dry meadows, foothills, and level uplands (Kochert 1986). It nests almost exclusively in trees and will nest in almost any tree species that is at least 10 feet tall (Schmutz et. al. 1984). Nests are constructed in isolated trees that are dead or alive along drainages and in wetlands, or in

Page 3

windbreaks in fields and around farmsteads (Palmer 1988). Swainson's hawks occasionally nest in shrubs, on telephone poles, and on the ground. In the Central Valley of California, the majority of Swainson's hawk nests and territories are associated with riparian systems and nests are commonly found in cottonwoods and oaks (Schlorff et. al. 1984). They have also been documented nesting in eucalyptus (*Eucalyptus* spp.), black walnut (*Juglans hindsii*), black locust (*Robinia pseudoacacia*), almond (*Prunus dulcis*), Osage orange (*Maclura pomifera*), Arizona cypress (*Cupressus arizonica*) and pine (*Pinus* spp.) (CNDDDB records).

Foraging habitats include alfalfa fields, fallow fields, beet, tomato, and other low-growing row or field crops, dry-land and irrigated pasture, and rice land when not flooded (CDFG 1994). The Swainson's hawk generally forages in open habitats with short vegetation containing small mammals, reptiles, birds, and insects. Its primary prey in the Central Valley is California meadow vole (*Microtus californicus*). Agricultural areas are often preferred over more natural grassland habitats due to larger prey populations. In addition, agricultural practices (planting, maintenance, harvesting, disking) allow for access to prey, and very likely increases foraging success of Swainson's hawks when farm equipment flushes prey during harvesting (observed many times by S. Lynch). During the nesting season, Swainson's hawks usually forage within two miles of their nests. Swainson's Hawk does not require habitats that contain many perches because it most often searches for prey aerially; therefore, it can occupy habitats with few or no perches except the nest tree (James 1992).

5. METHODS

Prior to completing the surveys, M&A searched the California Natural Diversity Database (CNDDDB) for SWHA records within 5 miles so that historic nest sites could be checked for activity. Surveys were conducted on March 16, 2023 (Survey Period I), March 22, 31 and April 3, 2023 (Survey Period II), and on April 11, 17, and 19 (Survey Period III) on the project site and a five-mile radius around the project site. All surveys were conducted following the California Department of Fish and Wildlife's (CDFW) *Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley*, which identifies different survey windows throughout the pre-nesting and nesting season (ranging from January 1 through July 30/post-fledging) that have different survey methodologies and requirements. These survey recommendations were developed by the Swainson's Hawk Technical Advisory Committee (TAC) to maximize the potential for locating nesting SWHA, and thus, reduce the potential for nest failures as a result of project activities and/or disturbances.

During each survey, M&A Biologists, Mr. Mark Jasper, Ms. Sarah McNamara, and/or Ms. Sarah Lynch conducted walking and driving surveys to look for nesting SWHA on or within a five-mile radius of the project site. M&A visited all previously known nesting records as reported to the CNDDDB. M&A also took note of any trees within 5 miles of the project site that provide potentially suitable nesting substrate for SWHA. Any SWHA observed was watched to determine its behavior and document its activity (e.g., was it defensive and exhibiting territorial behavior indicative of nesting?).

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6. SURVEY RESULTS

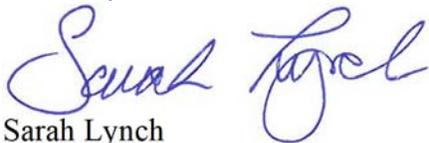
No Swainson's hawks were detected nesting on the project site or within a five-mile radius.

There are no trees or suitable nesting substrate on the project site; hence, there is not nesting habitat onsite. A SWHA was observed flying/foraging during two different surveys but this bird(s) was more than one mile (at least) from the project site and was not observed flying towards a nest. M&A visited the prior known SWHA nest sites as recorded in the CNDDDB and did not observe SWHA nesting at these locations. Other raptor species observed flying/foraging within the five-mile survey radius were Red-tailed Hawk (*Buteo jamaicensis*), Red-shouldered Hawk (*Buteo lineatus*), Golden Eagle (*Aquila chrysaetos*), Cooper's Hawk (*Accipiter cooperii*), Northern Harrier (*Circus hudsonius*), White-tailed Kite (*Elanus leucurus*) and American Kestrel (*Falco sparverius*). One Cooper's Hawk pair was noted nesting approximately 0.5-mile away from the project site at a city park. This pair is subject to cars and people driving and walking underneath its nest all day long as well as noisy activity in the park every day and is well-acclimated to disturbance. A pair of Red-tailed Hawks was noted nesting in a blue gum tree (*Eucalyptus globulus*) at a ranch approximately one mile from the project site. This sighting is far enough away from the project site that the birds would not be disturbed by project construction activities. No special-status species of any kind was observed nesting or residing on the project site or within a zone of influence where they could be disturbed by future project activities.

7. CONCLUSION

M&A is confident that at the time of the surveys and writing of this letter-report there were no active SWHA nests on the project site or within a five-mile radius of the project site. Additionally, M&A did not observe any other raptors nesting within a zone of influence of the project site; a Cooper's Hawk nest and a Red-Tailed Hawk nest were found during the surveys but these were both unlikely to be disturbed by project site activities. If construction activities do not commence this year, Swainson's Hawk preconstruction surveys will need to be repeated as this is a mobile species that can change nesting locations from year to year. Should you have any questions or wish to discuss any other aspect of this survey, please do not hesitate to call me at (925) 947-4867 extension 203.

Sincerely,



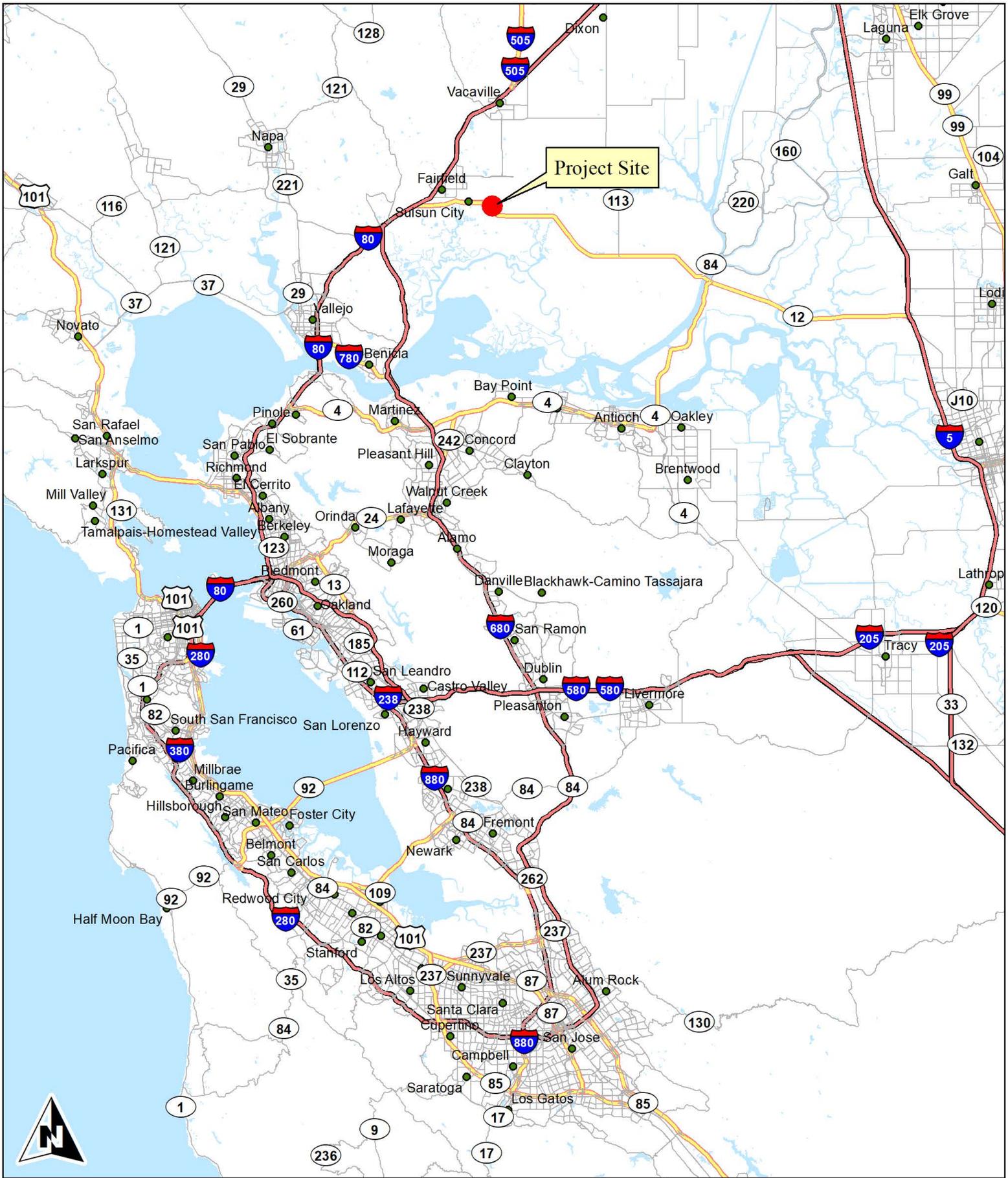
Sarah Lynch
Principal Biologist

Attachments: Figures 1-4

Literature Cited:

Page 5

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Figure 1. Suisun Logistics Center Project Site
 Regional Map
 Solano County, California

County: Solano
 Map Preparation Date: March 10, 2023



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0 0.1 0.2 0.4 0.6 0.8 1 Miles
Figure 2. Suisun Logistics Center Project Site
Location Map
Solano County, California

378.239733 -121.983473
Section: 33; T5N R1W
7.5-Minute Denverton quadrangle
Aerial Photograph Source: ESRI
Map Preparation Date: March 10, 2023



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Figure 3. Aerial Photograph of the
Suisun Logistics Center Project Site
Solano County, California

Aerial Photograph Source: ESRI
Map Preparation Date: March 10, 2023



Figure 4. Swainson's Hawk Occurrences
Within 5 Miles of the
Suisun Logistics Center Project Site

Table 1**Wildlife Species Observed within 5 miles of the Suisun Logistics Center Project Site****Birds**

Northern Flicker	<i>Colaptes auratus</i>
Double-crested Cormorant	<i>Phalacrocorax auritus</i>
Great Egret	<i>Ardea alba</i>
Snowy Egret	<i>Egretta thula</i>
Turkey Vulture	<i>Streptopelia decaocto</i>
Canada Goose	<i>Branta canadensis</i>
American wigeon	<i>Anas americana</i>
Mallard	<i>Anas platyrhynchos</i>
Cinnamon teal	<i>Anas cyanoptera</i>
Northern shoveler	<i>Anas clypeata</i>
Northern pintail	<i>Anas acuta</i>
Green-winged teal	<i>Anas crecca</i>
White-tailed Kite	<i>Elanus leucurus</i>
Northern Harrier	<i>Circus hudsonius</i>
Cooper's Hawk	<i>Accipiter cooperii</i>
Red-shouldered Hawk	<i>Buteo lineatus</i>
Swainson's Hawk	<i>Buteo swainsoni</i>
Red-tailed Hawk	<i>Buteo jamaicensis</i>
Golden eagle	<i>Aquila chrysaetos</i>
American Kestrel	<i>Falco sparverius</i>
Killdeer	<i>Charadrius vociferus</i>
Black-necked Stilt	<i>Himantopus mexicanus</i>
American avocet	<i>Recurvirostra americana</i>
Greater Yellowlegs	<i>Tringa melanoleuca</i>
Rock Pigeon	<i>Columba livia</i>
Eurasian Collared-Dove	<i>Streptopelia decaocto</i>
Mourning Dove	<i>Zenaida macroura</i>
Anna's Hummingbird	<i>Calypte anna</i>
Black Phoebe	<i>Sayornis nigricans</i>
Western Kingbird	<i>Tyrannus verticalis</i>
Loggerhead Shrike	<i>Lanius ludovicianus</i>
California Scrub Jay	<i>Aphelocoma californica</i>
American Crow	<i>Corvus brachyrhynchos</i>
Common Raven	<i>Corvus corax</i>
Tree Swallow	<i>Tachycineta bicolor</i>
Barn Swallow	<i>Hirundo rustica</i>
Ruby-crowned kinglet	<i>Regulus calendula</i>
American Robin	<i>Turdus migratorius</i>
Northern Mockingbird	<i>Mimus polyglottos</i>
European Starling	<i>Sturnus vulgaris</i>
Cedar Waxwing	<i>Bombycilla cedrorum</i>
Yellow-rumped Warbler	<i>Setophaga coronata</i>
White-crowned Sparrow	<i>Zonotrichia leucophrys</i>
Golden-crowned Sparrow	<i>Zonotrichia atricapilla</i>
Red-winged Blackbird	<i>Agelaius phoeniceus</i>
Tricolored Blackbird	<i>Agelaius tricolor</i>
Western Meadowlark	<i>Sturnella neglecta</i>
Brewer's Blackbird	<i>Euphagus cyanocephalus</i>

Table 1

Wildlife Species Observed within 5 miles of the Suisun Logistics Center Project Site

Great-tailed Grackle	<i>Quiscalus mexicanus</i>
Brown-headed Cowbird	<i>Molothrus ater</i>
House Finch	<i>Haemorhous mexicanus</i>

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C.8 - Amendment to Habitat Assessment for California Tiger Salamander

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March 15, 2024

Mr. Robert F. Perrera
Huffman-Broadway Group, Inc.
523 4th Street, Suite 224
San Rafael, California 94901-3358
rperrera@h-bgroup.com
(415) 925-2000

**RE: Amendment to Helm Biological Consulting's (HBC)
Habitat Assessment for California Tiger Salamander at the Suisun Logistics Center¹
Roadside Ditch along North Side of Peterson Road (0.39 acre)
Suisun Logistics Center Project
Suisun City, California
APN: 017-419-014 (~173 Acres)**

Dear Mr. Perrera:

1. INTRODUCTION

This letter-report has been prepared to present the results of Monk & Associates' (M&A) site assessment for California tiger salamander (*Ambystoma californiense*) (CTS) habitat in a roughly 0.39-acre roadside ditch along the north side of Petersen Road at the northern end of the roughly 173-acre Suisun Logistics project site located north of State Highway 12, east of Walters Road, and including Petersen Road in Solano County, California (hereinafter the "project site") (Figures 1-3). This CTS habitat assessment is confined to the 0.39-acre roadside ditch (hereinafter "Petersen Road Ditch" or "project site") along the north side of Petersen Road (Figure 3).

This CTS habitat assessment followed United States Fish and Wildlife Service (USFWS) and California Department of Fish and Wildlife's (CDFW) *Interim Guidance on Conducting Site Assessments and Field Surveys for Determining Presence or a Negative Finding of the California Tiger Salamander²* and consisted of background research of known records of CTS in the vicinity of the project site, review of Helm Biological Consulting's (HBCs) *Habitat Assessment* report¹ and field surveys as described below.

The joint USFWS/CDFW guidelines outline the following two procedures to accurately assess CTS presence or absence on or in the vicinity of a project site: (1) an assessment of CTS locality records and potential CTS habitat in and around the project area to determine the need for field surveys for the species; and (2) focused field surveys of pools and/or ponds and associated uplands to determine whether CTS are present. According to the guidelines, it may be necessary

¹ Helm Biological Consulting. 2023. *Habitat Assessment for California Tiger Salamander at the Suisun Logistics Center*, Solano County, California. September 2023. 32 pps.

² U.S Fish and Wildlife Service (USFWS). 2003. *Interim Guidance on Conducting Site Assessments and Field Surveys for Determining Presence or a Negative Finding of the California Tiger Salamander*.

to incorporate both procedures to determine the potential effects of projects on CTS, unless field surveys are determined to be unnecessary based on the findings of the site assessment.

Based on the results of the site assessment of the Petersen Road Ditch conducted on January 12 and March 4, 2024, M&A has determined that the Peterson Road Ditch does not provide suitable aquatic breeding habitat for CTS and there is a very low likelihood of CTS occurring on the project site. Below, we provide the location and description of the project site, the legal status and habitat requirements of CTS, the habitat assessment methods, results, and discussion of this determination.

2. ASSESSOR'S PARCEL NUMBER

The Assessor's Parcel Number for the project site is 017-419-014.

3. PROJECT SITE SETTING AND DESCRIPTION

The project site consists of an approximately 0.65 mile long, trapezoidal, roadside ditch along the north side of Petersen Road. This ditch was constructed along the north side of Peterson Road to facilitate drainage and to capture runoff that reaches the road from several fields located to the north. Three box culverts also cross perpendicularly through the Peterson Road Ditch, carrying water underneath the road to the southern roadside ditch. Two of these culverts connect to creeks that run perpendicular to the Petersen Road Ditch directing stormwater runoff southward from residential developments to the north. These perpendicular man-made channelized ditches/creeks support dense wetland vegetation dominated by non-native narrow leaf cattail (*Typha angustifolia*) and the native Tule (*Schoenoplectus acutus* var. *occidentalis*). The eastern half of the Petersen Road Ditch is only sparsely vegetated; it is more heavily vegetated along the western portion with ruderal herbaceous species such as bromes (*Bromus* spp.), yellow star thistle (*Centaurea solstitialis*), big heron bill (*Erodium botrys*), and Bermuda grass (*Cynodon dactylon*). Representative photos of the Peterson Road Ditch are included at the end of this report.

North of the project site are fields and a baseball field/public park. South of the project site is the roughly 173-acre Suisun Logistics project site (still in the planning phase) which is currently undeveloped and generally consists of cultivated agricultural fields and non-native annual grassland with scattered seasonal wetlands in the northern portion, and alkali meadow, seasonal wetlands, and coastal brackish marsh in approximately the southern third of the site. The surrounding area includes commercial and residential developments to the west, north, and northwest, undeveloped land to the east, undeveloped marsh, and grassland across Hwy 12 to the south, with cultivated and fallow agricultural land to the east. Travis Air Force Base (TAFB) is less than a mile northeast of the project site; Peterson Road dead ends at TAFB, providing access to the base for commercial truck deliveries. In 2021, a new gas station was constructed immediately west of the project site at the intersection of Hwy 12 and Walters Road which is along the Suisun Logistics Center project site's western flank.

4. CALIFORNIA TIGER SALAMANDER

4.1 CTS Legal Protections

The project site falls into the range of the Central California Distinct Population Segment (DPS) of the California tiger salamander. This DPS of the California tiger salamander was federally listed as threatened on August 4, 2004. The USFWS designated critical habitat for the California tiger salamander Central California DPS in 2005. *The project site is located outside of the closest mapped critical habitat for the Central California DPS which is roughly 6.5 miles east of the project site (Figure 4).*

On August 19, 2010, the California tiger salamander (all populations in California) was state listed as a threatened species under the California Endangered Species Act (CESA). Proposed projects may not impact California tiger salamanders without incidental take authority from both the USFWS and the CDFW. Prior to implementing a project that would result in “take” (i.e., to harm, harass, or kill) of CTS, the USFWS must prepare an incidental take permit pursuant to either Section 7 or Section 10 of the FESA. Similarly, projects that impact CTS also require incidental take authority from the CDFW pursuant to the CESA. Under Section 2081 of CESA an incidental take permit may be authorized by the CDFW for proposed projects that impact the California tiger salamander.

4.2 CTS Life History and Habitat Requirements

California tiger salamanders occur in grasslands and open oak woodlands that provide suitable over summering and/or breeding habitats. California tiger salamanders spend the majority of their lives underground. They typically only emerge from their subterranean refugia for a few nights each year during the rainy season to migrate to breeding ponds. Adult California tiger salamanders have been observed up to 2,092 meters (1.3 miles) from breeding ponds (USFWS 2004). As such, unobstructed migration corridors are an important component of California tiger salamander habitat.

California tiger salamanders emerge during the first heavy, warm rains of the year, typically in late November and early December. In most instances, larger movements of California tiger salamander do not occur unless it has been raining hard and continuously for several hours. Typically, for larger movements of California tiger salamanders to occur, nighttime temperatures also must be above 48° F. California tiger salamanders are able to move over, through or around almost all obstacles. Significant obstructions that block California tiger salamander movements include freeways and other major (heavy traffic) roads, rivers, and deep, vertical or near vertical sided, concrete irrigation/flood control ditches.

During the spring, summer, and fall months, most known populations of the California tiger salamander predominately use California ground squirrel burrows as over-summering habitat (Jennings and Hayes 1994; G. Monk personal observation). Other secondary subterranean refugia, or primary refugia where California ground squirrels are absent, likely include Botta’s pocket gopher burrows, deep fissures in desiccated clay soils, and debris piles (e.g. downed wood, rock piles).

Stock ponds, seasonal wetlands, and deep vernal pools typically provide most of the breeding habitat used by the California tiger salamander. In such locations, California tiger salamanders attach their eggs to rooted, emergent vegetation, and other stable filamentous objects in the water column. Eggs are gelatinous and are laid singly or occasionally in small clusters. Eggs range in size from about $\frac{3}{4}$ the diameter of a dime to the full diameter of a dime. Occasionally California tiger salamanders are found breeding in slow-moving, streams or ditches. Ditches and/or streams that are subject to rapid flows, even if only on occasion, typically will not support or sustain California tiger salamander egg attachment through hatching, and thus, are not usually used successfully by California tiger salamanders for breeding (G. Monk and S. Lynch, pers. observations). Similarly, streams and/or ditches that support predators of the California tiger salamander or their eggs and larvae such as fish, bullfrogs, red swamp crayfish, or signal crayfish, almost never constitute suitable breeding habitat.

Typically, seasonal wetlands that are used for breeding must hold water into the month of May to allow enough time for larvae to fully metamorphose. In dry years, seasonal wetlands may dry too early to allow enough time for California tiger salamander larvae to successfully metamorphose. Under such circumstances, desiccated California tiger salamander larvae can be found in dried pools. In addition, as pools dry down to very small areas of inundation, California tiger salamander larvae become concentrated and are very susceptible to predation. However, in years exhibiting wet springs, these same pools can remain inundated long enough through continual rewetting to allow California tiger salamander larvae ample time to successfully metamorphose.

Additional information on CTS life history, breeding and movement constraints and use of underground refugia are provided in the HBC Habitat Assessment.

5. ASSESSMENT METHODS

5.1 Background Research

Prior to preparing this biological resource analysis report, M&A researched the most recent version of CDFW's Natural Diversity Database (CNDDDB) (RareFind 5 application) (CNDDDB 2023). The CNDDDB is a database maintained by the CDFW that provides historic and recent records of special-status plant and animal species (that is, threatened, endangered, rare species) known from the state of California. All CNDDDB records of CTS within 5 miles of the Petersen Road Ditch are shown on Figure 5. M&A examined all known record locations for CTS to help determine if the Petersen Road Ditch could serve as suitable habitat for the California tiger salamander.

To determine if the Petersen Road Ditch could provide suitable CTS breeding habitat, all the following observable criteria had to be met:

- Ponding during CTS breeding season (December – February)
- Sufficient hydrologic period (Continuous inundation for >10 consecutive weeks)
- Hydrologic suitability (12 inches minimum ponding depth)

Ponding within the Petersen Road Ditch during the breeding season would have to be observed in aerial photographs or site visits and had to have a sufficient hydroperiod to be able to support CTS larval development (at least 10 weeks, typically holding water into the month of May). The ditch also would need to have lentic (standing freshwater) hydrology to be considered as suitable breeding habitat for CTS.

5.2 Known Records of CTS in the Vicinity of the Project Site

The nearest CNDDDB record of this species (CNDDDB Occurrence No. 1298) documents one juvenile CTS found dead on a road adjacent to a grassland dominated by invasive grasses and forbs (broad-leaved plants) in January 2018 roughly 1.0 mile east of the project site. The next nearest record (CNDDDB Occurrence No. 1320) is from 2017 and documents roughly 70 adult CTS trapped along a drift fence adjacent to a former wastewater treatment pond known to support breeding CTS at Travis Air Force Base roughly 2.9 miles east of the Petersen Road Ditch. This record also notes that the CTS trapped during this study were moved to suitable refugia habitat nearby.

5.3 Site Surveys

M&A Principal Biologist Sarah Lynch visited the project site on January 12, 2024, to conduct a field assessment of the Petersen Road Ditch and to note its potential to provide aquatic breeding habitat for CTS. The depth of inundation within the ditch was also checked by Ms. Lynch on January 18, 2024, after a rain event and again by M&A Project II Biologist Mark Jasper on March 4, 2024. The entire ditch was dry during the January 12 site visit, while the ditch was partially inundated on January 18 with depth of inundation ranging from 1-6 inches.

6. RESULTS AND DISCUSSION

Although potential aquatic breeding and upland dispersal/overwintering habitats may occur within the vicinity of the project site, the Petersen Road Ditch project site does not support suitable CTS aquatic breeding habitat for several reasons.

1. The Petersen Road Ditch does not inundate deep enough to support CTS eggs/larvae. The maximum depth observed this winter is 7 inches and this depth fluctuates often due to high flows following storm events.
2. High flows cause scour and detach CTS eggs from the vegetation and substrate, carrying the eggs (and early-stage larvae) offsite.
3. This ditch does not remain inundated long enough to support CTS larvae to metamorphosis. CTS breeding pools must hold water for a consecutive period of 10 weeks or into the month of May to allow CTS larvae enough time to reach metamorphosis. This ditch flows and dries down at the end of the rainy season; it is not designed to hold water for long duration.
4. Further, this ditch is heavily disturbed and polluted with roadside garbage and oil and grease runoff from the road.
5. The ditch supports predators. Red swamp crayfish (*Procambarus clarkii*) nauplii are abundant in this ditch; this crustacean is a predator of CTS eggs and larvae.

Habitat Assessment for California Tiger Salamander
Peterson Road Ditch
Suisun Logistics Center Project
Suisun City, California

Page 6

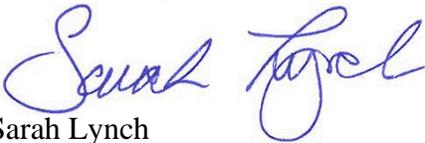
7. CONCLUSION

Based on all the reasons provided above, the Peterson Road Ditch does not provide habitat for CTS. This concludes the habitat assessment of the northern Petersen Road Ditch at the north end of the Suisun Logistics Center project site. If you have any questions or require additional information, please do not hesitate to call one of us at (925) 847-4867 or email at Mark@monkassociates.com or Sarah@monkassociates.com. Thank you.

Sincerely,



Mark Jasper
Project Biologist II



Sarah Lynch
Principal Biologist

Attachments: Photo Page and Figures 1 – 5

Representative Photos of Petersen Road Ditch



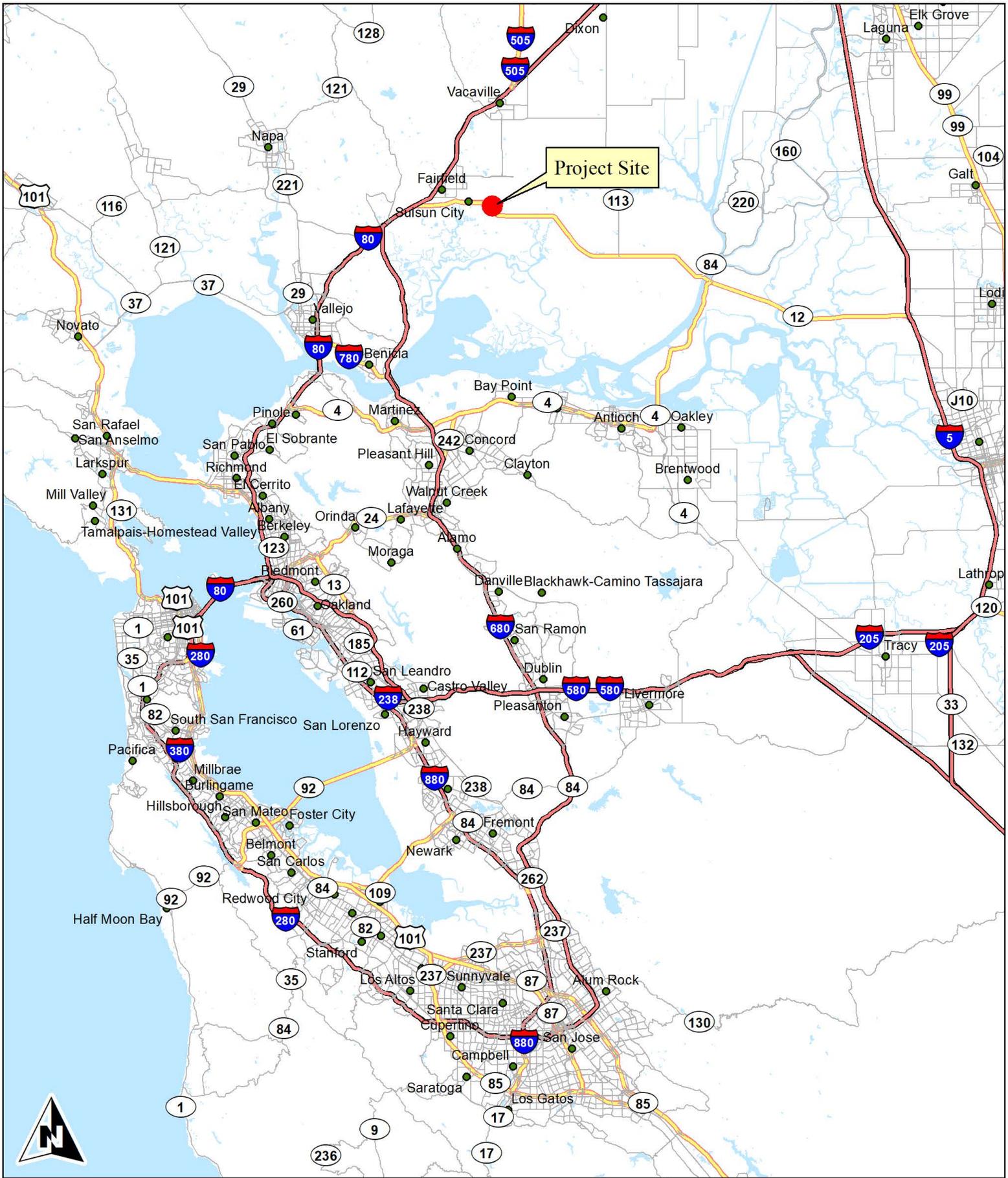
Photo 1. Petersen Road Ditch. Photo taken facing west on March 4, 2024



Photo 2. Petersen Road Ditch. Photo taken facing east on February 29, 2024



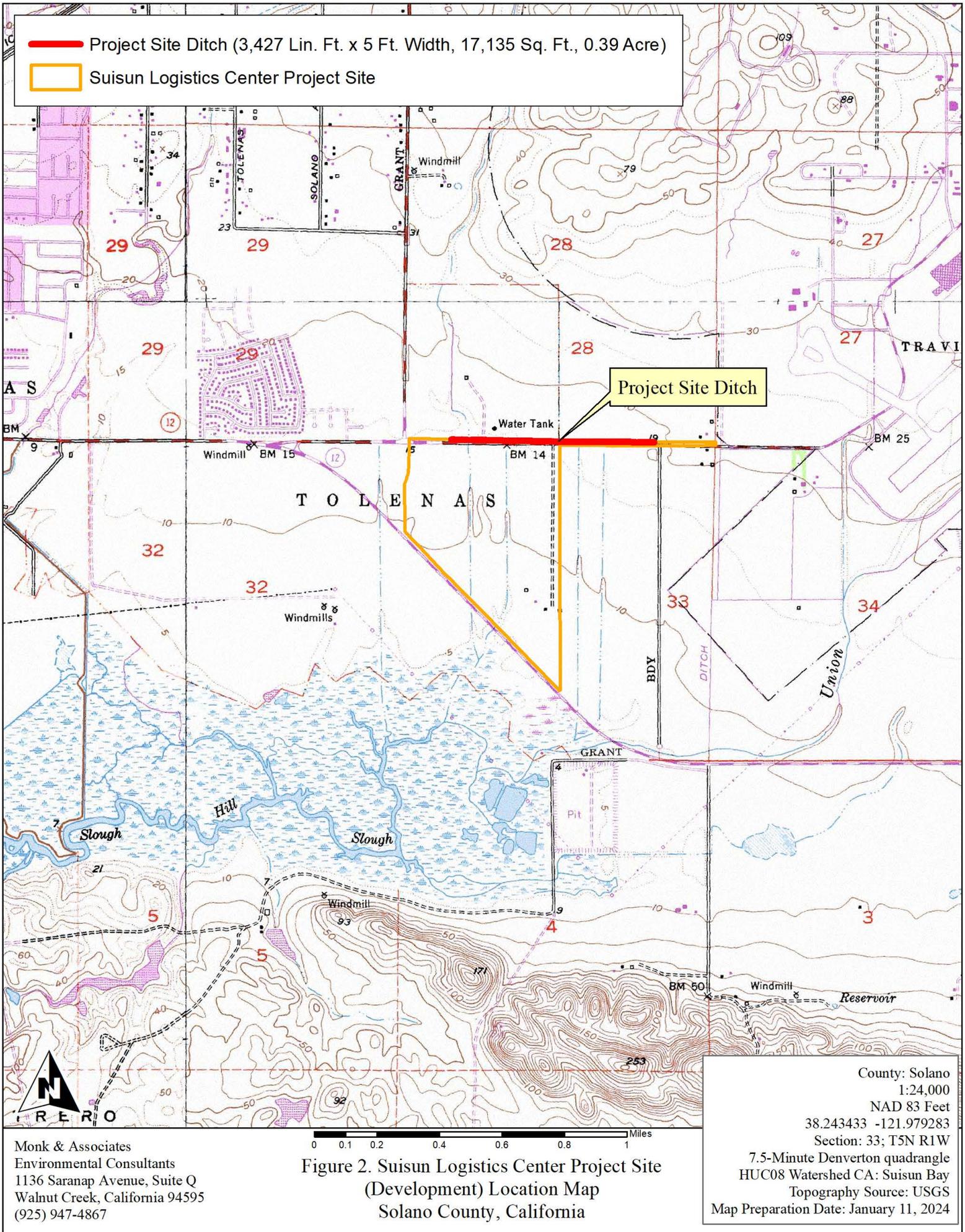
Photo 3. Petersen Road Ditch. Photo taken facing northeast on February 9, 2024.



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Figure 1. Suisun Logistics Center Project Site
 Regional Map
 Solano County, California

County: Solano
 Map Preparation Date: January 11, 2024



— Project Site Ditch (3,427 Lin. Ft. x 5 Ft. Width, 17,135 Sq. Ft., 0.39 Acre)
 Suisun Logistics Center Project Site

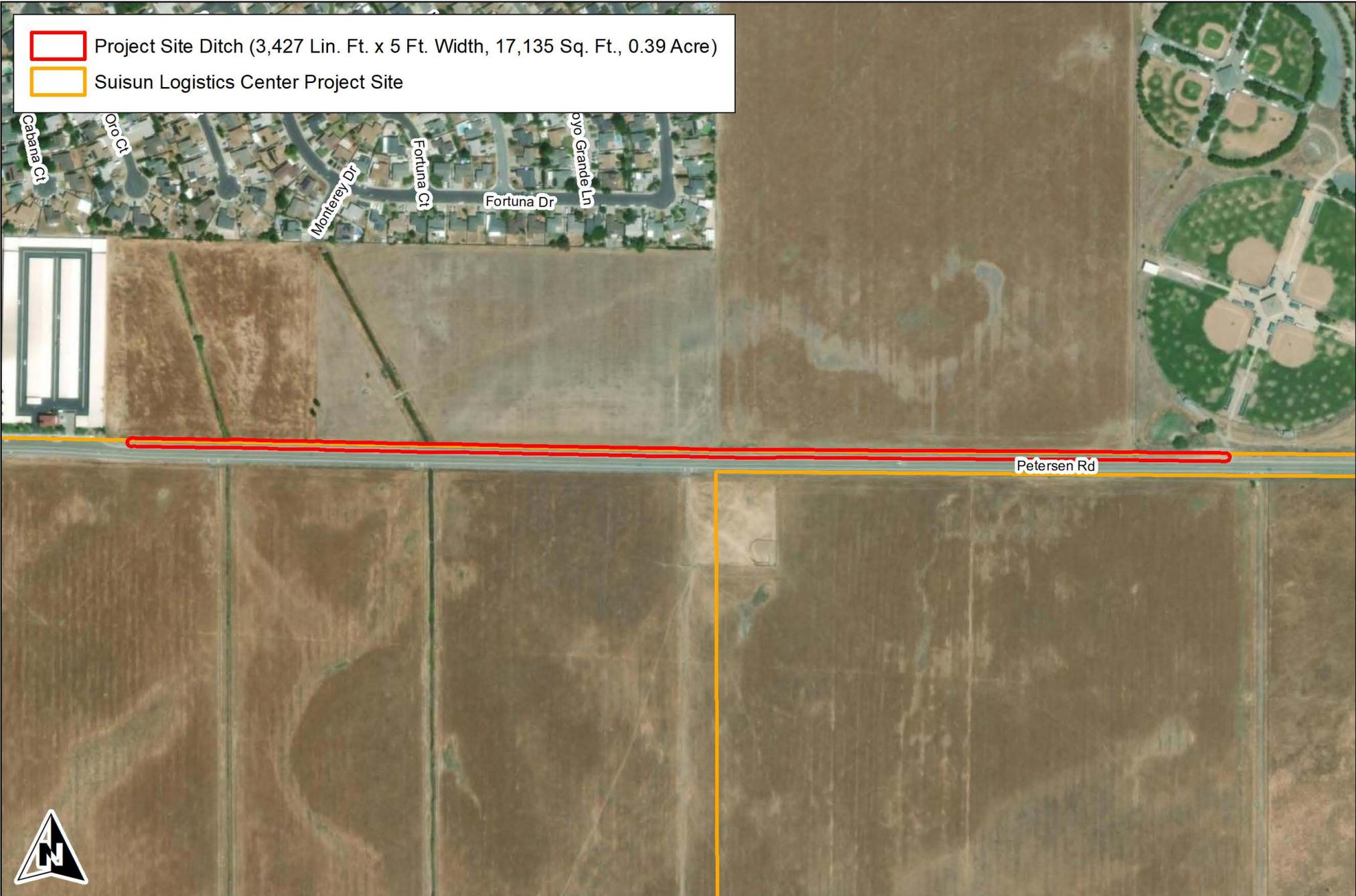
Project Site Ditch

Figure 2. Suisun Logistics Center Project Site (Development) Location Map
Solano County, California

Monk & Associates
 Environmental Consultants
 1136 Saranap Avenue, Suite Q
 Walnut Creek, California 94595
 (925) 947-4867

County: Solano
 1:24,000
 NAD 83 Feet
 38.243433 -121.979283
 Section: 33; T5N R1W
 7.5-Minute Denverton quadrangle
 HUC08 Watershed CA: Suisun Bay
 Topography Source: USGS
 Map Preparation Date: January 11, 2024

-  Project Site Ditch (3,427 Lin. Ft. x 5 Ft. Width, 17,135 Sq. Ft., 0.39 Acre)
-  Suisun Logistics Center Project Site

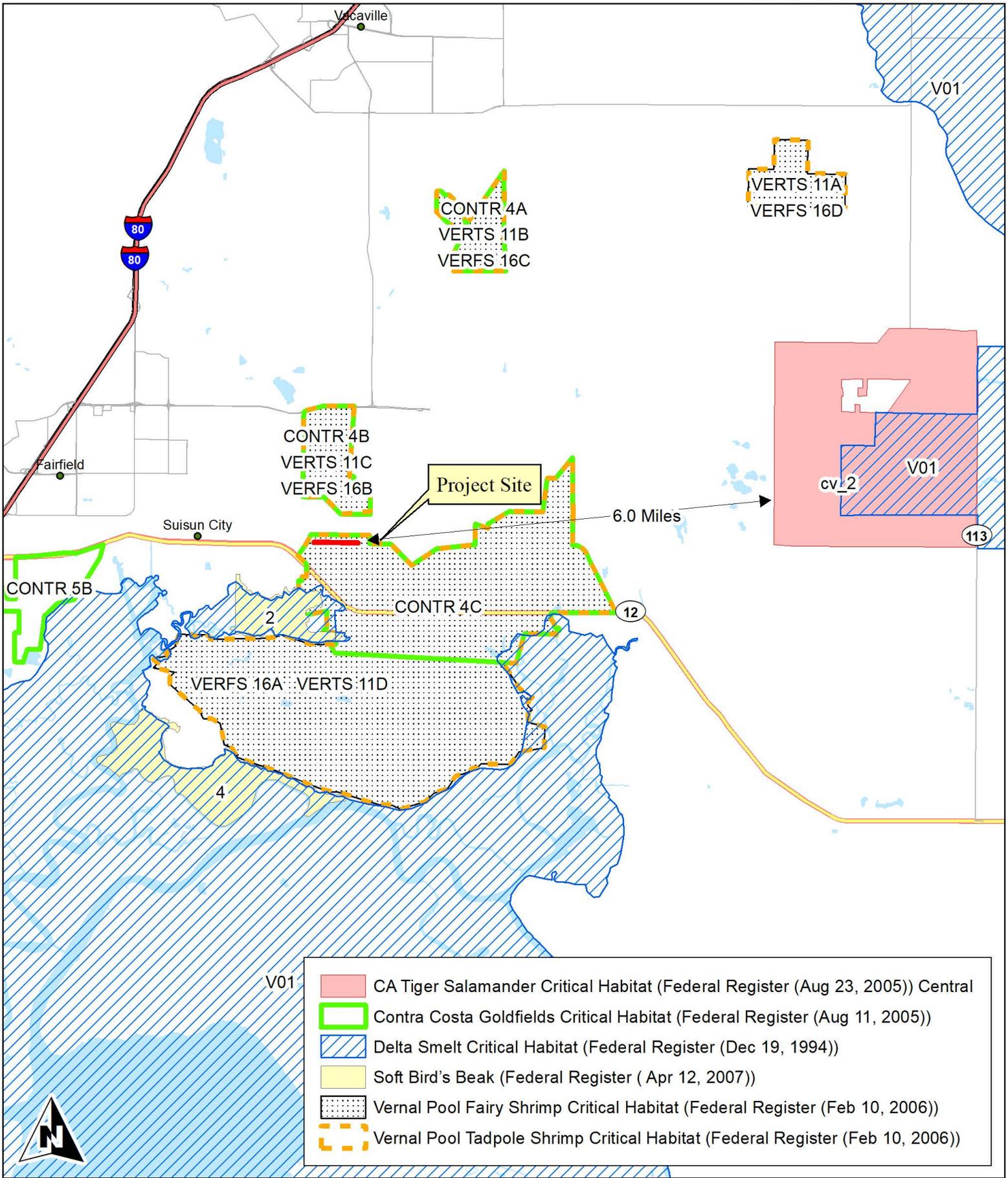


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0 100 200 400 600 800 1,000 Feet

Figure 3. Aerial Photograph of the
Suisun Logistics Center Project Site
Solano County, California

Aerial Photograph Source: ESRI
Map Preparation Date: January 11, 2024



- CA Tiger Salamander Critical Habitat (Federal Register (Aug 23, 2005)) Central
- Contra Costa Goldfields Critical Habitat (Federal Register (Aug 11, 2005))
- Delta Smelt Critical Habitat (Federal Register (Dec 19, 1994))
- Soft Bird's Beak (Federal Register (Apr 12, 2007))
- Vernal Pool Fairy Shrimp Critical Habitat (Federal Register (Feb 10, 2006))
- Vernal Pool Tadpole Shrimp Critical Habitat (Federal Register (Feb 10, 2006))

Figure 4. USFWS Critical Habitat
 in the Vicinity of the
 Suisun Logistics Center Project Site

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C.9 - Vernal Pool Branchiopod Wet Season Survey

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**VERNAL POOL BRANCHIOPOD WET SEASON SURVEYS
NORTHERN PETERSEN ROAD DITCH
SUISUN LOGISTICS CENTER PROJECT SITE
SOLANO COUNTY, CALIFORNIA
APN: 017-419-014**

USFWS # RP-Petersen Road-2024-1118

May 15, 2024

Prepared for:

U.S. Fish and Wildlife Service
Sacramento Field Office
Recovery Branch
2800 Cottage Way, Room W2605
Sacramento, California 95825-1846

Attention: Ms. Megan Cook, Sacramento Valley Division Supervisor

megan_cook@fws.gov
FW8_SFVO_Permits@fws.gov

Prepared by:

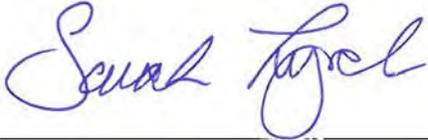
Monk & Associates, Inc.
Contact: Ms. Sarah Lynch

Vernal Pool Branchiopod Wet Season Survey Report
Petersen Road Ditch, Suisun, Solano County, California
USFWS # RP-Petersen Road-2024-1118

SUMMARY

In the winter of 2023-2024, Monk & Associates, Inc. (M&A) conducted wet season protocol surveys for federally-listed large vernal pool Branchiopods in the northern Petersen Road Ditch adjacent to the Suisun Logistics Center Property Project Site. The Petersen Road ditch and the Suisun Logistics Center Property Project Site are located north of State Highway 12 and east of Walters Road just outside Suisun City in Solano County, California. During appropriately timed, protocol wet season surveys on the northern Petersen Road Ditch, M&A did not identify any fairy shrimp species or vernal pool tadpole shrimp. Based on M&A’s wet season survey findings we have determined that the northern Petersen Road Ditch does not provide habitat for federally-listed large vernal pool Branchiopods and that dry season surveys are not warranted. Modifications to the northern Petersen Road Ditch should not impact federally-listed large Branchiopods.

I CERTIFY THAT THE INFORMATION IN THIS SURVEY REPORT AND ATTACHED EXHIBITS FULLY AND ACCURATELY REPRESENTS MY WORK:



Surveyor

TE-776608-13
Permit Number

May 10, 2024
Date

TABLE OF CONTENTS

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2. PROJECT SITE LOCATION AND DESCRIPTION..... 1

3. PURPOSE FOR CONDUCTING VERNAL POOL BRANCHIOPOD SURVEYS 2

4. SURVEY METHODS 2

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- Figure 2. USGS Topographic Map of the Northern Petersen Road Ditch at the Suisun Logistics Center Project Site
- Figure 3. Location Map of the Northern Petersen Road Ditch at the Suisun Logistics Center Project Site
- Figure 4. Closest Known Records of Vernal Pool Branchiopods to the Suisun Logistics Center Project Site, Solano County, California
- Figure 5. Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp Designated Critical Habitat in the Vicinity of the Suisun Logistics Center Project Site

SHEET

- Sheet 1. Petersen Road Drainage Ditches. Areas Surveyed for Vernal Pool Branchiopods

ATTACHMENTS

- Attachment A. Photographs of the Suisun Logistics Center Site
- Attachment B. Vernal Pool Branchiopod Data Sheets

1. INTRODUCTION

In the winter of 2023-2024, Monk & Associates, Inc. (M&A) completed wet season sampling (protocol surveys) for large vernal pool Branchiopods in the northern Petersen Road Ditch next to the Suisun Logistics Center Property Project Site. This project site is located North of State Highway 12 and east of Walters Road outside of Suisun City in Solano County, California (Figures 1 and 2). This Branchiopod survey is confined to the 0.39-acre roadside ditch (hereinafter “Petersen Road Ditch” or “project site”) along the north side of Petersen Road (Figure 3).

Protocol surveys for federally-listed large Branchiopods were conducted in accordance with: (1) U.S. Fish and Wildlife Service’s (USFWS) revised *Guidelines for the Listed Large Branchiopods* (USFWS 2017); (2) the conditions stipulated in M&A’s Federal 10(a)(1)(A) permit (number TE-776608); and (3) M&A’s California Department of Fish and Wildlife (CDFW) scientific collector permits. M&A received written authorization to conduct wet season protocol surveys on the project site from USFWS’ Sacramento Field Office on January 18, 2024 (email communication between S. Lynch of M&A and Lauren Kong of the USFWS’ Sacramento Field Office at SFWO Permits, FW8 (FW8_SFOWO_Permits@fws.gov)).

This report has been prepared in accordance with USFWS’ revised *Guidelines for the Listed Large Branchiopods* (2017) distributed to Federal 10(a)(1)(A) permittees. Below we provide a description of the project site, the purpose for conducting vernal pool Branchiopod surveys on the project site, and our survey methods and results.

2. PROJECT SITE LOCATION AND DESCRIPTION

The project site consists of an approximately 0.65-mile long, trapezoidal, roadside ditch (covering 0.39-acre) along the north side of Petersen Road outside of Suisun City in Solano County, California. This ditch was constructed along the north side of Petersen Road to facilitate drainage and to capture runoff that reaches the road from several fields located to the north as well as sheet flows from the road itself. Three box culverts also cross perpendicularly through the Petersen Road Ditch, carrying water underneath the road to the southern roadside ditch. Two of these culverts connect to creeks that run perpendicular to the Petersen Road Ditch directing stormwater runoff southward from residential developments to the north. These perpendicular man-made channelized ditches/creeks support dense wetland vegetation dominated by non-native narrow leaf cattail (*Typha angustifolia*) and the native tule (*Schoenoplectus acutus* var. *occidentalis*). The eastern half of the Petersen Road Ditch is only sparsely vegetated; it is more heavily vegetated along the western portion with ruderal herbaceous species such as bromes (*Bromus* spp.), yellow star thistle (*Centaurea solstitialis*), big heron bill (*Erodium botrys*), and Bermuda grass (*Cynodon dactylon*). Representative photos of the Petersen Road Ditch are included at the end of this report.

North of the project site are fields and a baseball field/public park. South of the project site is the roughly 173-acre Suisun Logistics project site (still in the planning phase) which is currently undeveloped and generally consists of cultivated agricultural fields and non-native annual grassland with scattered seasonal wetlands in the northern portion, and alkali meadow, seasonal wetlands, and coastal brackish marsh in approximately the southern third of the site. The

surrounding area includes commercial and residential developments to the west, north, and northwest, undeveloped land to the east, undeveloped marsh, and grassland across Hwy 12 to the south, with cultivated and fallow agricultural land to the east. Travis Air Force Base (TAFB) is less than a mile northeast of the project site; Petersen Road dead ends at TAFB, providing access to the base for commercial truck deliveries. In 2021, a new gas station was constructed immediately west of the project site at the intersection of Hwy 12 and Walters Road which is along the Suisun Logistics Center project site's western flank.

3. PURPOSE FOR CONDUCTING VERNAL POOL BRANCHIOPOD SURVEYS

The purpose for conducting the wet-season Branchiopod surveys was to determine if the Petersen Road Ditch supports federally listed branchiopods such as the vernal pool fairy shrimp (*Branchinecta lynchi*), since the site is located within federally designated critical habitat (Figure 5).

4. SURVEY METHODS

Survey methods were conducted in accordance with USFWS' November 7, 2017, revised *Survey Guidelines for the Listed Large Branchiopods*. Since the project site is located in Survey Zone A (San Francisco Bay Area), these survey guidelines require adequate sampling of all pools/swales on a property at least once every 14 days beginning when they hold greater than 3 cm of standing water twenty-four hours after a rain event. In accordance with the revised *Survey Guidelines for the Listed Large Branchiopods*, surveys were conducted starting in January 2024 and continued until the ditch was no longer inundated (or held less than 3 centimeters of water), or until the ditch experienced at least 90 days of continuous inundation.

Sampling procedures entailed visually inspecting the water for fairy shrimp and/or tadpole shrimp and other invertebrates each survey event before dip-netting. Dip-netting the ditch was completed with a fine mesh standard aquatic net (12-inch diameter triangular net bag). The net was dragged through the pool's water column along an approximately 12 to 24-inch long section of ditch at a time in a zig-zag pattern as much as the ditch's dimensions allowed, and then passed back over the same area to catch any invertebrates that may have been stirred up by the current. The edges as well as the center of the ditch were sampled. Several dips with the net were made in each ponded area of the ditch before it was determined that fairy shrimp/vernal pool tadpole shrimp were not present in that inundated portion of the ditch on that particular day.

After each pass with the net, the net was checked for fairy shrimp and/or vernal pool tadpole shrimp, and other invertebrates. During each sampling event, overall site conditions and weather, including the date of the last rain event, were recorded on a standardized datasheet or in field notes. Additionally, during each sampling event measurements were made of each pool's size, water depth, and vegetation composition. All invertebrates present in each pool were identified to order (e.g., Copepoda, Ostracoda) and recorded on the datasheet. Similarly, any amphibians present were identified to species, and their life cycle stage was noted (e.g., egg mass, larvae, adult). Copies of the datasheets are included as Attachment B.

5. SURVEY RESULTS

No fairy shrimp or tadpole shrimp were identified in ditch during the course of the wet season surveys. M&A only observed common invertebrates such as Cladocera, Hemiptera, Ostracods, and one amphibian, Sierran tree frog (*Pseudacris sierra*) larvae (Attachment B). Nauplii (i.e., larval form) of a likely non-native species of crayfish (signal or red swamp crayfish (*Pacifastacus leniusculus* and *Procambarus clarkii*, respectively), were also observed along the ditch in abundance. Below we provide the survey dates and results.

5.1 Survey Dates

M&A federally permitted biologist Sarah Lynch first visited the project site ditch on January 12, 2024, to assess conditions and check for inundation. The ditch was dry on this date. After a series of rain events commenced on January 13 and continued until January 16, the ditch inundated. During a January 18, 2024, site survey, between 1 and 4 inches of water was observed standing in the ditch (depth was dependent upon the location along the ditch; i.e., depending on how incised the ditch is in each location). M&A conducted seven (7) separate dip-netting surveys in the ditch. Survey dates were January 18, January 26, February 9, February 23, March 13, March 29, and April 9, 2024. The ditch was 95% dry on April 9th except for one stagnant pool at the location of a culvert which discharges stormwater runoff from a detention basin. While the April 9th survey is just shy of the 90 days of inundation required by the survey protocol, this one remaining pool along the ditch was coated in green algae with stagnant water and trash, and did not constitute suitable large Branchiopod habitat. Thus, a decision was made not to return to survey this one remaining pool one more time (which would have been the completion of 90 days of inundation).

5.2 Characteristics of the Sampled Ditch

Figure 3 shows the sampled ditch. The ditch is a long, linear feature that collects road runoff in addition to detention basin overflow water and stormwater runoff from the farm fields immediately to the north. Halfway through the sampling season it was determined that the ditch does not provide suitable large Branchiopod habitat for several reasons: (1) It is subject to high flows which scours the ditch substrate (gravels and fine sediment) and carries the substrate downstream and offsite through a culvert system (which means essentially any cysts would be washed downstream); (2) the deeper portions of the ditch become heavily vegetated in January and February with facultative (FAC) grass species which chokes out all the open water habitat; (3) the ditch receives urban runoff from the road (petroleum particulates and oils) and agricultural fields (potential herbicides and pesticides); and (4) the ditch is full of garbage such as dumped clothing, toilets, bottles, and other urban waste.

5.3 Organisms Identified in the Ditch

No vernal pool Branchiopods were identified in the ditch. The sampled ditch was found to support: Ostracods, Cladocera, Hemiptera, Dytiscids, crayfish nauplii, and in a few locations, Sierran tree frog larvae.

5.4 Known Nearby Locations of Vernal Pool Branchiopods

The vernal pool fairy shrimp was identified on the Suisun Logistics Center Property Project Site immediately south of Petersen Road in 2023 by Dr. Brent Helm (Figure 4). This sighting is

hydrologically separated from the project site by Petersen Road. Additionally, culverts located in the northern Petersen Road Ditch carry flows south, to the southern Petersen Road ditch. Water does not flow north from the Suisun Logistics Center Property Project Site to the Petersen Road ditch. Even if flows in the ditches did back up and get pushed north into the northern ditch, both roadside ditches are separate from the vernal pool/swale complex on the Suisun Logistics Center Property Project Site and thus, it is not expected that vernal pool fairy shrimp found on the Suisun Logistics Center Property Project Site would be found in the northern Petersen Road ditch.

6. CONCLUSIONS

No federally-listed fairy shrimp or vernal pool tadpole shrimp were identified in the Petersen Road ditch during wet season surveys conducted in the winter of 2023-2024. No common species of fairy shrimp were identified either (for example, *Linderiella occidentalis*). Only common invertebrate species such as Ostracods, Cladocera, Hemiptera, and non-native crayfish nauplii were identified. M&A also identified Sierran tree frog larvae along the ditch. No other amphibian larvae were observed. Due to the Petersen Road ditch's marginal habitat, high seasonal flows, and the unclean runoff it receives, this ditch is not considered suitable habitat for federally-listed large Branchiopods.

Vernal Pool Branchiopod Survey Report
Petersen Road Ditch, Solano County, California

7. SURVEY AND REPORT PREPARATION PARTICIPANTS

Sarah Lynch, Certified Wildlife Biologist, Protocol Surveys and Report Preparation

Vernal Pool Branchiopod Survey Report
Petersen Road Ditch, Solano County, California

8. LITERATURE CITED

California Natural Diversity Data Base (BIOS 6). 2024. RareFind 5. California Natural Heritage Division, California Department of Fish and Game, Sacramento, CA.

Helm Biological Consulting. 2023. Federally-listed large branchiopod sampling at the Suisun Logistics Center Solano County, California. June 2023.

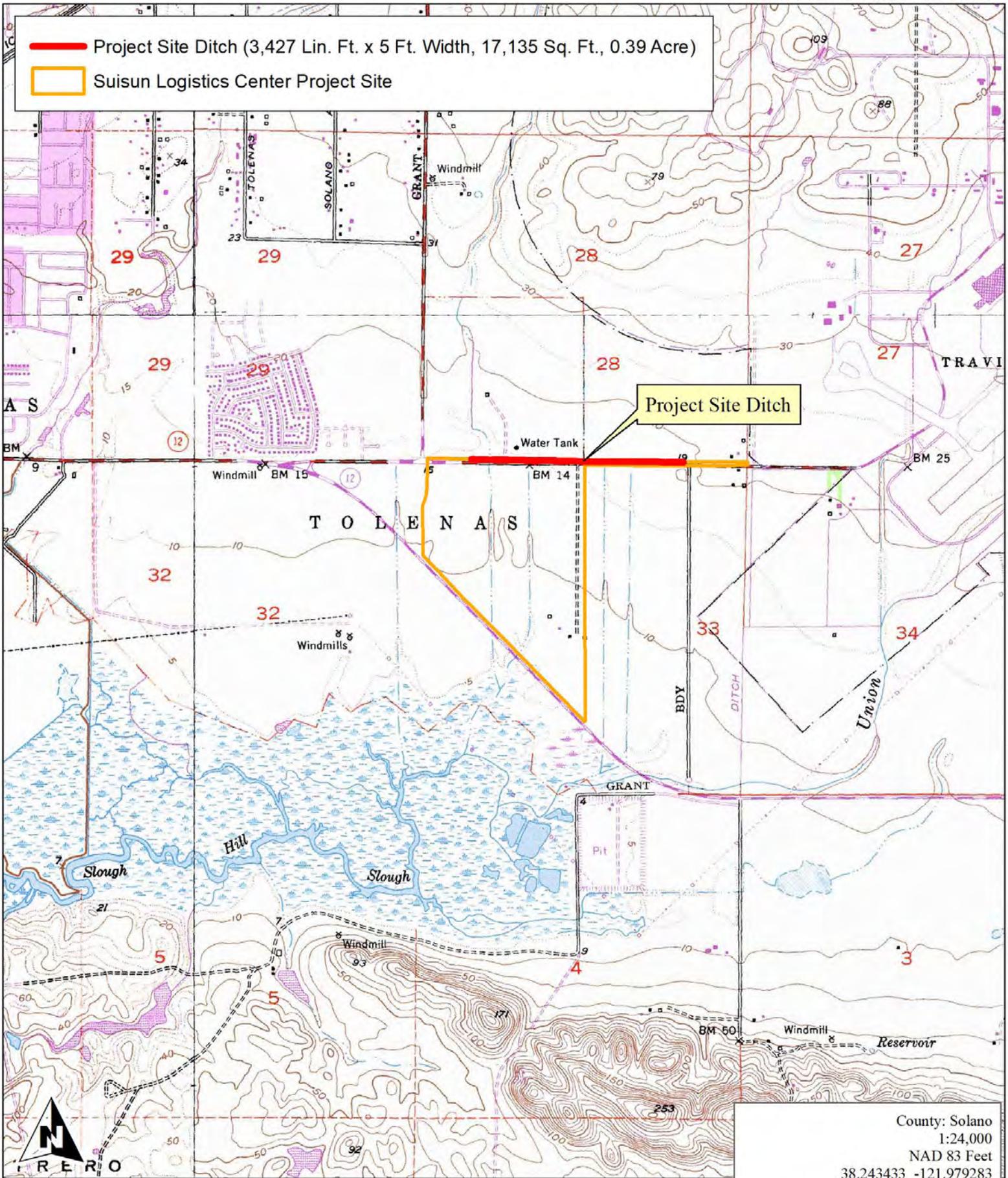
USFWS (U.S. Fish & Wildlife Service). 2017. Survey Guidelines for the Listed Large Branchiopods. 24 pps. November 7, 2017.



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Figure 1. Suisun Logistics Center Project Site
 Regional Map
 Solano County, California

County: Solano
 Map Preparation Date: January 11, 2024



Monk & Associates
 Environmental Consultants
 1136 Saranap Avenue, Suite Q
 Walnut Creek, California 94595
 (925) 947-4867

Figure 2. Suisun Logistics Center Project Site
 (Development) Location Map
 Solano County, California

County: Solano
 1:24,000
 NAD 83 Feet
 38.243433 -121.979283
 Section: 33; T5N R1W
 7.5-Minute Denverton quadrangle
 HUC08 Watershed CA: Suisun Bay
 Topography Source: USGS
 Map Preparation Date: January 11, 2024

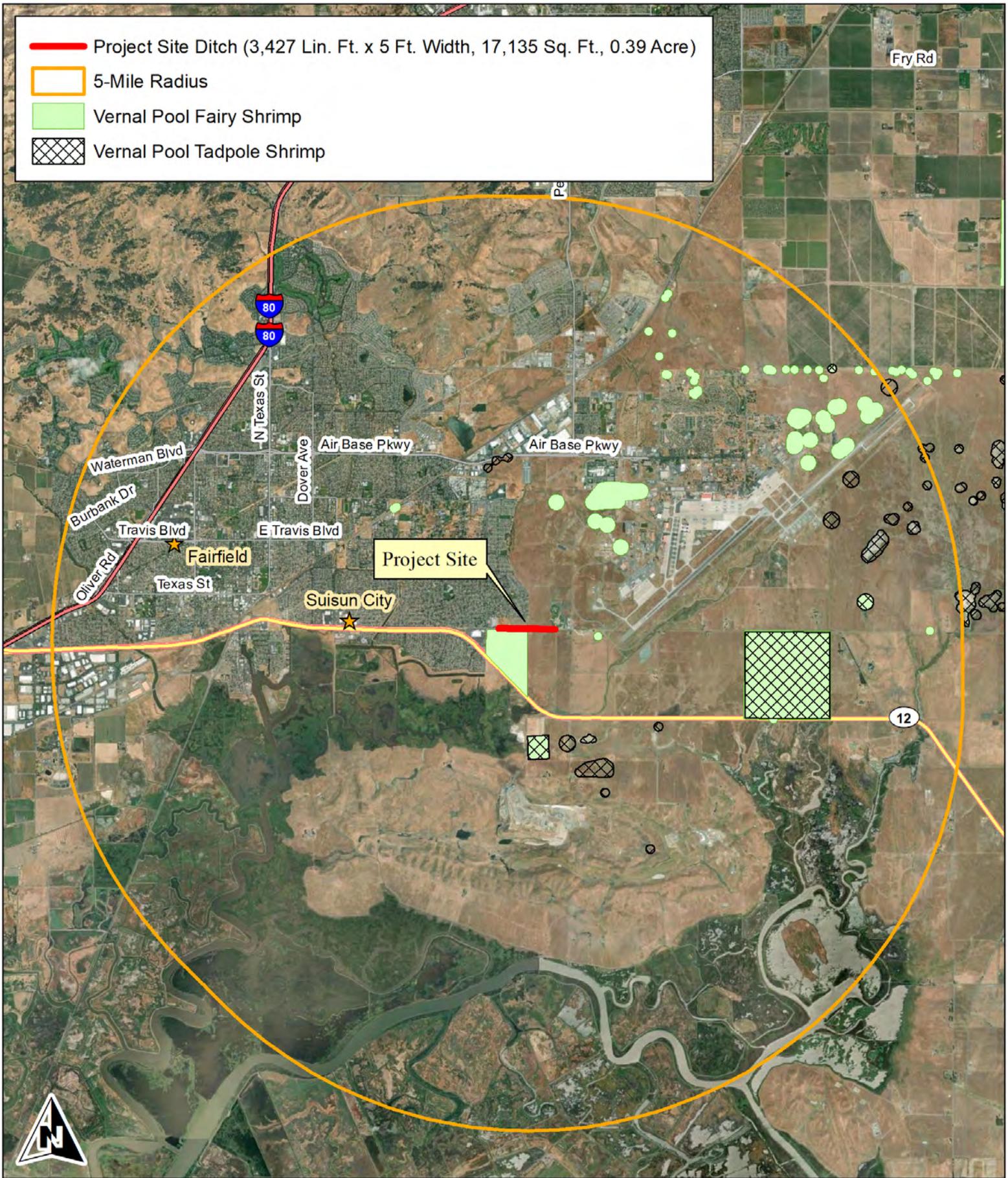


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Environmental Consultants
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Walnut Creek, California 94595
(925) 947-4867

0 100 200 400 600 800 1,000 Feet

Figure 3. Aerial Photograph of the
Suisun Logistics Center Project Site
Solano County, California

Aerial Photograph Source: ESRI
Map Preparation Date: January 11, 2024



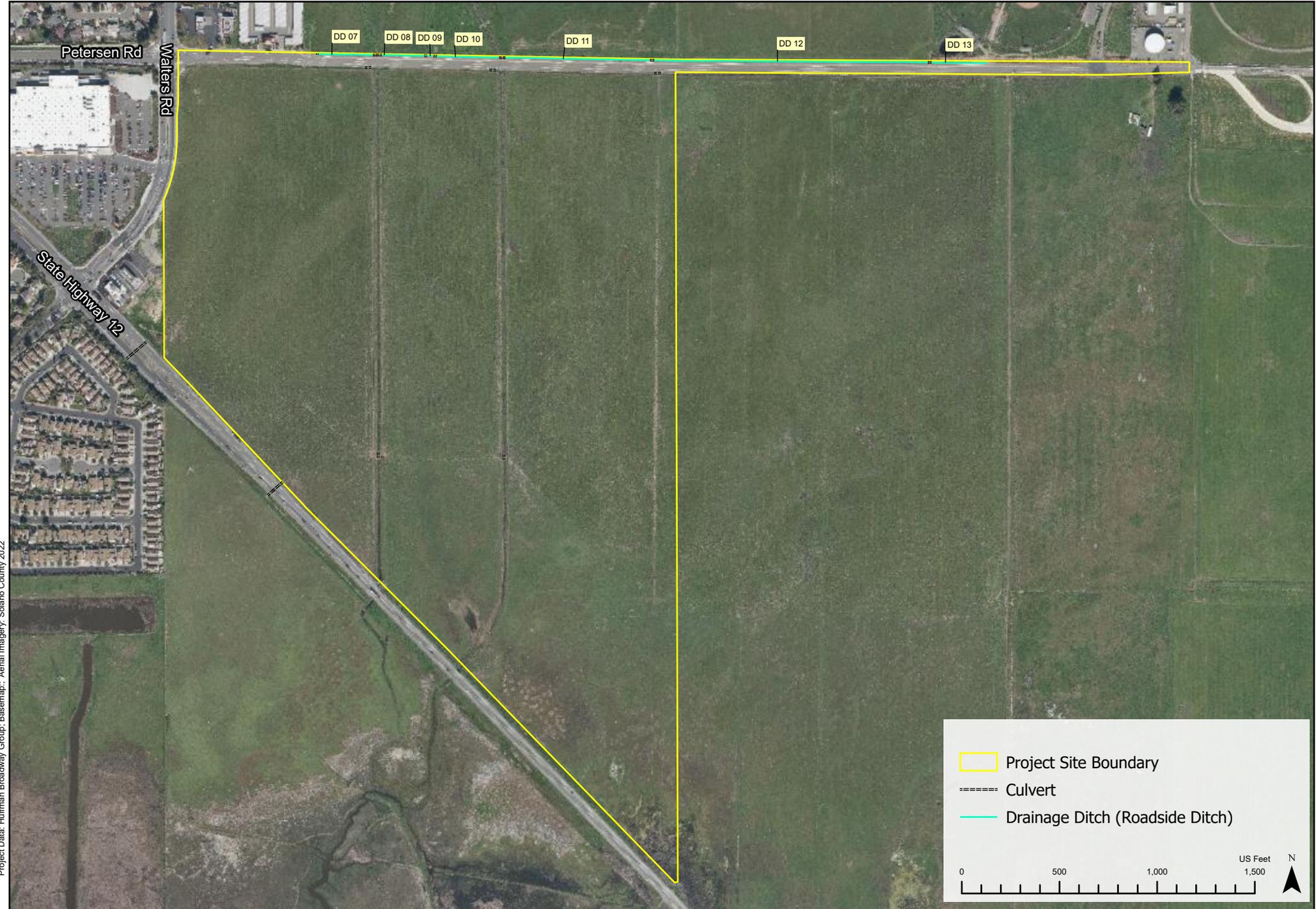
- Project Site Ditch (3,427 Lin. Ft. x 5 Ft. Width, 17,135 Sq. Ft., 0.39 Acre)
- 5-Mile Radius
- Vernal Pool Fairy Shrimp
- Vernal Pool Tadpole Shrimp

Figure 4. Closest Known Records of Vernal Pool Branchiopods to the Suisun Logistics Center Project Site Solano County, California



- Project Site Ditch (3,427 Lin. Ft. x 5 Ft. Width, 17,135 Sq. Ft., 0.39 Acre)
- Vernal Pool Tadpole Shrimp Critical Habitat (Federal Register (Feb 10, 2006))
- Vernal Pool Fairy Shrimp Critical Habitat (Federal Register (Feb 10, 2006))

Figure 5. Critical Habitat in the Vicinity of
the Suisun Logistics Center Project Site
Solano County, California



Project Data: Huffman Broadway Group; Basemap: Aerial Imagery; Solano County 2022

Petersen Road Drainage Ditches

Suisun Logistic Center Project
Solano County, California

Project Site Boundary
 Culvert
 Drainage Ditch (Roadside Ditch)

0 500 1,000 1,500 US Feet
 N

Huffman-Broadway Group, Inc.
 ENVIRONMENTAL REGULATORY CONSULTANTS

Spatial Reference:
 Name: NAD 1983 2011 StatePlane California II FIPS 0402 Ft US
 Scale: 1:7,500
 Map Created Date: 1/10/2024
 GIS Specialists: Agie Gilmore
 HBG Project Manager: Robert F. Perraera

Project Data: Huffman Broadway Group; Basemap: Aerial Imagery; Solano County 2022



 Project Site Boundary

 Culvert

 Drainage Ditch (Roadside Ditch)

0 50 100 150 200 US Feet

N

Petersen Road Drainage Ditches

Suisun Logistic Center Project
Solano County, California

Huffman-Broadway Group, Inc.
ENVIRONMENTAL REGULATORY CONSULTANTS

Spatial Reference:
Name: NAD 1983 2011 StatePlane California II FIPS 0402 Ft US
Scale: 1:1,000
Map Created Date: 1/10/2024
GIS Specialists: Agie Gilmore
HBG Project Manager: Robert F. Perraera

Project Data: Huffman Broadway Group; Basemap: Aerial Imagery; Solano County 2022



DD 10

DD 11

Project Site Boundary
 Culvert
 Drainage Ditch (Roadside Ditch)

0 50 100 150 200 US Feet N

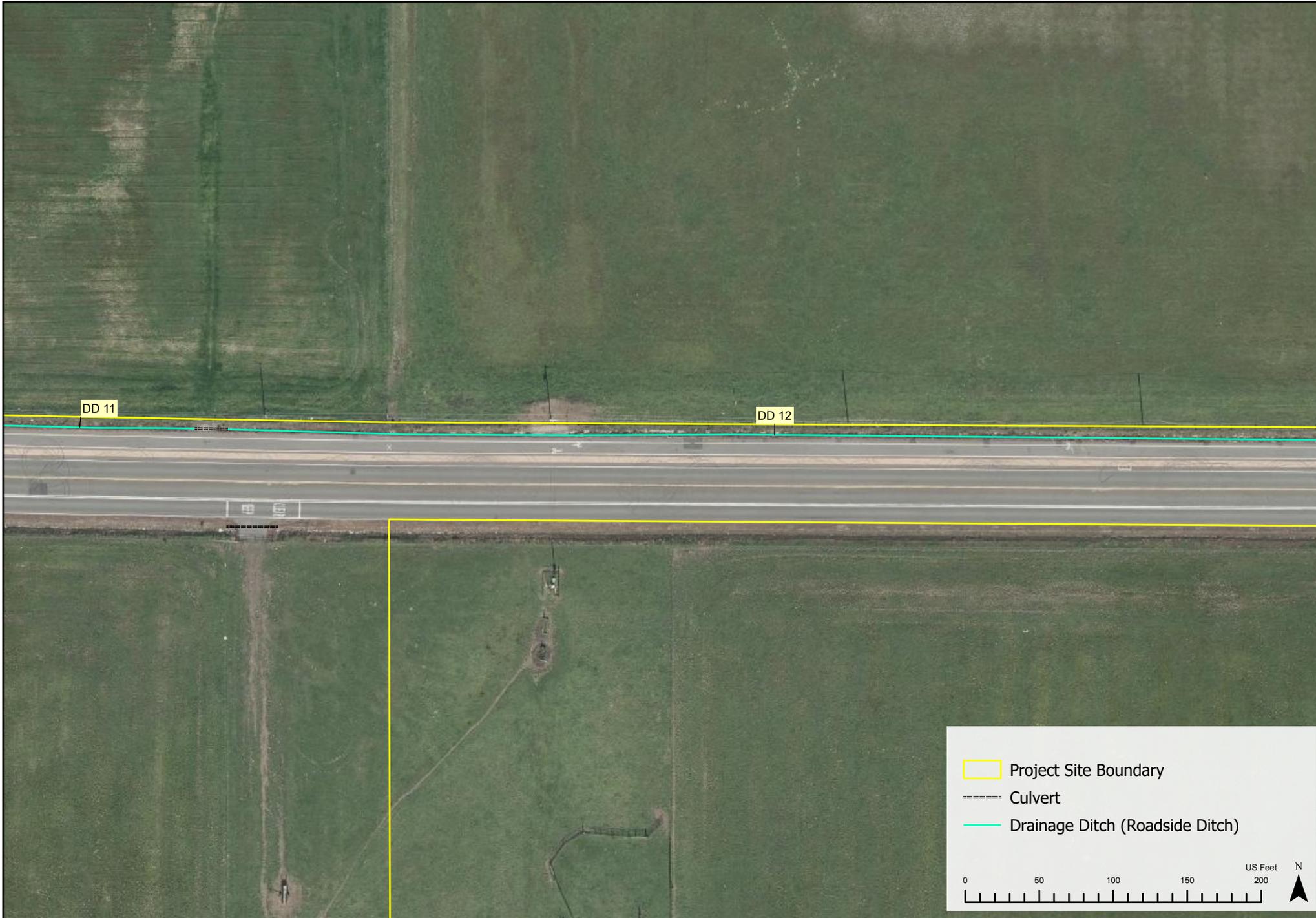
Petersen Road Drainage Ditches

Suisun Logistic Center Project
Solano County, California

Huffman-Broadway Group, Inc.
ENVIRONMENTAL REGULATORY CONSULTANTS

Spatial Reference:
Name: NAD 1983 2011 StatePlane California II FIPS 0402 Ft US
Scale: 1:1,000
Map Created Date: 1/10/2024
GIS Specialists: Agie Gilmore
HBG Project Manager: Robert F. Perraera

Project Data: Huffman Broadway Group; Basemap: Aerial Imagery; Solano County 2022



Petersen Road Drainage Ditches

Suisun Logistic Center Project
Solano County, California

Huffman-Broadway Group, Inc.
ENVIRONMENTAL REGULATORY CONSULTANTS

Spatial Reference:
Name: NAD 1983 2011 StatePlane California II FIPS 0402 Ft US
Scale: 1:1,000
Map Created Date: 1/10/2024
GIS Specialists: Agie Gilmore
HBG Project Manager: Robert F. Perraera

Project Data: Huffman Broadway Group; Basemap: Aerial Imagery; Solano County 2022



Project Site Boundary
 Culvert
 Drainage Ditch (Roadside Ditch)

0 50 100 150 200 US Feet N

Petersen Road Drainage Ditches

Suisun Logistic Center Project
Solano County, California

Huffman-Broadway Group, Inc.
ENVIRONMENTAL REGULATORY CONSULTANTS

Spatial Reference:
Name: NAD 1983 2011 StatePlane California II FIPS 0402 Ft US
Scale: 1:1,000
Map Created Date: 1/10/2024
GIS Specialists: Agie Gilmore
HBG Project Manager: Robert F. Perraera

Project Data: Huffman Broadway Group; Basemap: Aerial Imagery; Solano County 2022



DD 13

Project Site Boundary
 Culvert
 Drainage Ditch (Roadside Ditch)

0 50 100 150 200 US Feet N

Petersen Road Drainage Ditches

Suisun Logistic Center Project
Solano County, California

Huffman-Broadway Group, Inc.
ENVIRONMENTAL REGULATORY CONSULTANTS

Spatial Reference:
Name: NAD 1983 2011 StatePlane California II FIPS 0402 Ft US
Scale: 1:1,000
Map Created Date: 1/10/2024
GIS Specialists: Agie Gilmore
HBG Project Manager: Robert F. Perra

Project Data: Huffman Broadway Group; Basemap: Aerial Imagery; Solano County 2022



Petersen Road Drainage Ditches

Suisun Logistic Center Project
Solano County, California

Huffman-Broadway Group, Inc.
ENVIRONMENTAL REGULATORY CONSULTANTS

Spatial Reference:
Name: NAD 1983 2011 StatePlane California II FIPS 0402 Ft US
Scale: 1:1,000
Map Created Date: 1/10/2024
GIS Specialists: Agie Gilmore
HBG Project Manager: Robert F. Perrera

Representative Photos of Petersen Road Ditch



Photo 1. Petersen Road Ditch near location DD08. Photo taken facing west on February 9, 2024
Flow lines observed in the upland grasses growing along the ditch.



Photo 2. Petersen Road Ditch near DD12. Photo taken facing east on February 29, 2024



Photo 3. Petersen Road Ditch. Photo taken facing northeast on February 9, 2024.

Appendix 1. U.S. Fish and Wildlife Service – Data Sheet for Wet Season Surveys For Listed Large Branchiopods

Site or Project Name: Peterson Rd. Ditch Huffman Suisun Log County: Solano Quad: Denverton Township: Range: Section: 28
 Surveyor/ Permit Number: S. Lynch, TE-776608

Date: 01/12/24 Time: 9:00am Weather conditions: overcast, foggy, 45(f), 5mph wind

Feature ID #	UTM (Northing, Easting, Datum)	Temp (C)		Depth		Surface area (m x m)		Crustaceans					Insects			Platyhelminths (flatworms)	Habitat Condition	Notes / Voucher information	
		Air	Water	Avg.(in)	Est. Max.	Present	Est. Max.	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae				Diptera Chironomidae
DD07		7		0															dry
DD08		7		0															dry
DD09		7		0															dry
DD10		7		0															dry
DD11		7		0															dry
DD12		7		0															dry
DD13		7		0															

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLI = Branchinecta lindahli).
 For habitat conditions use two letter abbreviation as follows: NP = Natural Pool, CP = Constructed Pool; UD = undisturbed, D = disturbed: with TT = tire tracks, T = trash, P = plowed; G = grazed, UG = ungrazed by: C = cattle, H = horses, S = sheep; AB = Algal blooms present.
 (Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service – Data Sheet for Wet Season Surveys For Listed Large Branchiopods

Site or Project Name: Peterson Road Ditch, Suisun Logistics C County: Solano Quad: Denverton Township: Range: Section: 28
 Surveyor/ Permit Number: S. Lynch, TE-776608

Date: 01/18/24 Time: 9:00am Weather conditions: overcast, foggy, 50(f), last rained 2 days ago

Feature ID #	UTM (Northing, Easting, Datum)	Temp (C)		Depth		Surface area (m x m)		Crustaceans					Insects			Platyhelminths (flatworms)	Habitat Condition	Notes / Voucher information
		Air	Water	Avg.(in)	Est. Max.	Present	Est. Max.	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae			Diptera Chironomidae
DD07		10		2		portion of ditch									x		x	
DD08		10		2		portion of ditch									x		x	
DD09		10		2		portion of ditch									x		x	
DD10		10		2		portion of ditch									x		x	
DD11		10		3	6	portion of ditch			X						x			Dytiscid beetles
DD12		10		3	6	portion of ditch									x			
DD13		10		6		portion of ditch									x			

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLL = Branchinecta lindahl).
 For habitat conditions use two letter abbreviation as follows: NP = Natural Pool, CP = Constructed Pool; UD = undisturbed, D = disturbed: with TT = tire tracks, T = trash, P = plowed; G = grazed, UG = ungrazed by: C = cattle, H = horses, S = sheep; AB = Algal blooms present.
 (Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service – Data Sheet for Wet Season Surveys For Listed Large Branchiopods

Site or Project Name: Peterson Road Ditch, Suisun Logistics County: Solano Quad: Denverton Township: Range: Section: 28
 Surveyor/ Permit Number: S. Lynch, TE-776608

Date: 01/26/24 Time: 10:00am Weather conditions: 59(f), overcast, 24 hrs since last rain

Feature ID #	UTM (Northing, Easting, Datum)	Temp (C)		Depth		Surface area (m x m)		Crustaceans					Insects			Platyhelminths (flatworms)	Habitat Condition	Notes / Voucher information
		Air	Water	Avg. (in)	Est. Max.	Present	Est. Max.	Anostracans	Notostracans	Amphipoda	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae			Diptera Chironomidae
DD13		15		2														crayfish nauplii
DD12		15		11	22						X	X						crayfish nauplii
DD11		15		1	2						X							crayfish nauplii
DD10		15		1	2						X							
DD9		15		1	2						X							
DD8		15		1	2						X							
DD7		15		0							X							

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLI = Branchinecta lindahl).

For habitat conditions use two letter abbreviation as follows: NP = Natural Pool, CP = Constructed Pool; UD = undisturbed, D = disturbed; with TT = tire tracks, T = trash, P = plowed; G = grazed, UG = ungrazed by: C = cattle, H = horses, S = sheep; AB = Algal blooms present. (Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service – Data Sheet for Wet Season Surveys For Listed Large Branchiopods

Site or Project Name: Peterson Road Ditch Suisun Logistics County: Solano Quad: Denverton Township: Range: Section: 28
 Surveyor/ Permit Number: S. Lynch, TE-776608

Date: 02/09/24 Time: 12:00pm Weather conditions: 55(f), sunny, clear, last rain 2 days ago

Feature ID #	UTM (Northing, Easting, Datum)	Temp (C)		Depth		Surface area (m x m)		Crustaceans					Insects				Platyhelminths (flatworms)	Habitat Condition	Notes / Voucher information	
		Air	Water	Avg. (in)	Est. Max.	Present	Est. Max.	Anostracans	Notostracans	Amphipoda	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae				
DD12		13		12	20	portion of ditch			X	X	X									flow
DD12		13		7	9	portion of ditch			X	X	X						X			flow
DD12		13		6	7	portion of ditch			X	X	X						X			creyfish
DD11		13		7	9	portion of ditch				X	X						X			flow
DD10		13		6	8	portion of ditch														flow
DD10		13		6	8	portion of ditch					X	X					X			fast flow
DD10		13		6	8	portion of ditch					X	X					X			flow
DD9		13		0	0	portion of ditch														
DD8		13		0	0	portion of ditch														
DD7		13		2	3	portion of ditch					X	X								

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLLI = Branchinecta lindahl).

For habitat conditions use two letter abbreviation as follows: NP = Natural Pool, CP = Constructed Pool; UD = undisturbed, D = disturbed: with TT = tire tracks, T = trash, P = plowed; G = grazed, UG = ungrazed by: C = cattle, H = horses, S = sheep; AB = Algal blooms present. (Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service – Data Sheet for Wet Season Surveys For Listed Large Branchiopods

Site or Project Name: Peterson Road Ditch Suisun Logistics County: Solano Quad: Denverton Township: Range: Section: 28
 Surveyor/ Permit Number: S. Lynch, TE-776608

Date: 02/23/24 Time: 12:00pm Weather conditions: 64 degrees, overcast. Wind 5 to 10 mph.

Feature ID #	UTM (Northing, Easting, Datum)	Temp (C)		Depth		Surface area (m x m)		Crustaceans					Insects				Platyhelminths (flatworms)	Habitat Condition	Notes / Voucher information
		Air	Water	Avg. (in)	Est. Max.	Present	Est. Max.	Anostracans	Notostracans	Amphipoda	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
DD12		13		12	20						X	X							crayfish common. Entire ditch not suitable habitat to fairy shrimp due to fast flows and predators.
DD12		13		4	9						X	X					X		culvert pools deep
DD12		13		4	7						X	X					X		wrack lines from high flows
DD11		13		2	9						X	X					X		wrack lines from high flows
DD10		13		2	8														
DD10		13		2	8						X	X					X		
DD10		13		2	8												X		
DD9		13		2	0														
DD8		13		0	0														
DD7		13		2	3														

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLL = Branchinecta lindahli).

For habitat conditions use two letter abbreviation as follows: NP = Natural Pool, CP = Constructed Pool; UD = undisturbed, D = disturbed; with TT = tire tracks, T = trash, P = plowed; G = grazed, UG = ungrazed by: C = cattle, H = horses, S = sheep; AB = Algal blooms present. (Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service – Data Sheet for Wet Season Surveys For Listed Large Branchiopods

Site or Project Name: Peterson Road Ditch/ Suisun Logistics County: Solano Quad: Denverton Township: Range: Section: 28
 Surveyor/ Permit Number: S. Lynch, TE-776608

Date: 03/12/24 Time: 12:30pm Weather conditions: rain, overcast, 59(f)

Feature ID #	UTM (Northing, Easting, Datum)	Temp (C)		Depth		Surface area (m x m)		Crustaceans					Insects				Platyhelminths (flatworms)	Habitat Condition	Notes / Voucher information
		Air	Water	Avg. (in)	Est. Max.	Present	Est. Max.	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			Crayfish nauplii abundant
DD7		15		1.5										X	X				crayfish
DD8		15		1.5										X					crayfish
DD9		15		1.5															crayfish
DD10		15		1.5															crayfish
DD11		15		1.5															crayfish
DD12		15		1.5															
DD13		15		4															

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLI = Branchinecta lindahli).
 For habitat conditions use two letter abbreviation as follows: NP = Natural Pool, CP = Constructed Pool; UD = undisturbed, D = disturbed; with TT = tire tracks, T = trash, P = plowed; G = grazed, UG = ungrazed by: C = cattle, H = horses, S = sheep; AB = Algal blooms present.
 (Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service – Data Sheet for Wet Season Surveys For Listed Large Branchiopods

Site or Project Name: Peterson Road Ditch Suisun Logistics County: Solano Quad: Denverton Township: Range: Section: 34
 Surveyor/ Permit Number: S. Lynch, TE-776608

Date: 03/29/24 Time: Weather conditions: rain, 7mph SE wind, 88% humidity, 50(f)

Feature ID #	UTM (Northing, Easting, Datum)	Temp (C)		Depth		Surface area (m x m)		Crustaceans					Insects				Platyhelminths (flatworms)	Habitat Condition	Notes / Voucher information						
		Air	Water	Avg. (in)	Est. Max.	Present	Est. Max.	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae									
DD07		10		1.5											x		x								
DD08		10		0													x		x						
DD09		10		10																			crayfish		
DD10		10		3																					
DD11		10		4																					
DD12		10		4																					
DD13		10		1																					

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLI = Branchinecta lindahli).
 For habitat conditions use two letter abbreviation as follows: NP = Natural Pool, CP = Constructed Pool; UD = undisturbed, D = disturbed; with TT = tire tracks, T = trash, P = plowed; G = grazed, UG = ungrazed by: C = cattle, H = horses, S = sheep; AB = Algal blooms present.
 (Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service – Data Sheet for Wet Season Surveys For Listed Large Branchiopods

Site or Project Name: Peterson Road Ditch Suisun Logistics County: Solano Quad: Denverton Township: Range: Section: 28

Surveyor/ Permit Number: S. Lynch, TE-776608

Date: 04/09/24 Time: Weather conditions: Weather 74 f degrees today. Calm. Sunny.

Feature ID #	UTM (Northing, Easting, Datum)	Temp (C)		Depth		Surface area (m x m)		Crustaceans					Insects				Platyhelminths (flatworms)	Habitat Condition	Notes / Voucher information
		Air	Water	Avg. (in)	Est. Max.	Present	Est. Max.	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
DD07		23		0														T	
DD08		23		0														T	
DD09		23		0														T	
DD10		23		0														T	
DD11		23		0														T	
DD12		23		12							X							T	Algae; Pseudacris
DD13		23		0														T	

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLLI = Branchinecta lindahli).
 For habitat conditions use two letter abbreviation as follows: NP = Natural Pool, CP = Constructed Pool; UD = undisturbed, D = disturbed: with TT = tire tracks, T = trash, P = plowed; G = grazed, UG = ungrazed by: C = cattle, H = horses, S = sheep; AB = Algal blooms present.
 (Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.